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"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted; and it will die away, if they shall entirely cease."—
SIR WM. JONES.

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No. VI. of the last year's Journal—containing the concluding portion of Mr. Hodgson's vocabularies will be published shortly.

JOURNAL

OF THE

ASIATIC SOCIETY.

No. II. 1858.

Notes of the Karen Language.—By Francis Mason.

The Karens.

Karen is a Burmese word applying to the mountaineers of Pegu and Southern Burmah. It has been derived from *ayen*, foundation, and *ka* a form of particle; thus signifying aboriginal; and I find some of the Bghai tribes call themselves *kayay*, and this may be the origin of the Burmese word. It is, however, manifest that the Karens are not the aboriginal inhabitants of the countries where they now dwell.

In my early travels, the Karens pointed out to me the precise spots where they took refuge in the days of Alompra, and where they had come down and avenged themselves on their enemies; but when I asked them, "Who built this city?"—as we stood together on the forest-clad battlements of a dilapidated fortification,—they replied, "These cities of our jungles were in ruins when we came here. This country is not our own. We came from the north, where we were independent of the Burmese, the Siamese and the Talings, who now rule over us. There we had a city and country of our own near Ava, called Toungoo. All the Karens of Siam, Burmah and Pegu came originally from that region." When I asked for the time of their dispersion, they were silent. The fact was clearly before them, but the retrospect was too obscure to determine the distance. Yet they saw far beyond Toungoo. On the edge of the misty horizon was "The river of running sand," which their an-

cestors had crossed before coming. That was a fearful, trackless region, where the sands rolled before the winds like the waves of the sea. They were led through it by a chieftain who had more than human power to guide them; and Sau Quala, when he first related the tradition, remarked that the whole story seemed to him like Moses guiding the children of Israel across the Red Sea and through the desert.

To what this river, or waters, of running sand referred, was quite an enigma to me for several years, till I met with the Journal of the Chinese Buddhist pilgrim Fa Hian, who came from China to India in the early part of the fifth century of the Christian era. He thus designates the great desert between China and Tibet. The governor of the "Town of Sands," he says, furnished his party with "the necessary means of crossing the River of Sand." "There are evil spirits in this River of Sand," he continues, "and such scorching winds, that whoso encountereth them dies, and none escape. Neither birds are seen in the air, nor quadrupeds on the ground. On every side, as far as the eye can reach, if you seek for the proper place to cross, there is no other mark to distinguish it than the skeletons of those who have perished there; these alone seem to indicate the route." Karen tradition says that the chieftain who led the party stretched out the staff in his hand as they crossed, from time to time, and stones rolled up in a path before them, to show the course they ought to take.

This emigration occurred about the time the Shans first settled in Labong and Zimmay; because the tradition represents the chieftain to have come over first with an exploring party, and that they selected the region around Labong and Zimmay for their future home; but when he returned with his nation, he found it occupied by the Shans.

The oldest of these cities is Labong, and, according to Dr. Richardson, Shan history states that that city was built A. D. 574; so this emigration of the Karens may have occurred some centuries after the commencement of the Christian era. Their traditions point unequivocally to an ancient connection with China; for Tie or Tien is spoken of as a god inferior to Jehovah; and offering to the manes of their ancestors is as common among the Karens as it is among the Chinese.

No further historical event has been found in their traditions till they impinge on Scriptural history at the dispersion of nations. The dispersion they represent to have arisen from want of love to each other and lack of faith in God, while the difference of language they attribute to the effect of the dispersion. Beyond this they have a tradition of the deluge, and then an account of the creation and fall of man coinciding so minutely with the statements of the Bible,—even preserving the names of Adam and Eve,—that they must have been derived from the written record since the days of Moses. Where, for example, do we find in the traditions of heathen nations that never saw the Bible, biblical facts so accurately stated as in the following stanzas?

"Anciently, God commanded, but Satan appeared bringing destruction.

Formerly, God commanded, but Satan appeared deceiving unto death.

The woman E-u and the man Tha-nai pleased not the eye of the dragon,

The persons of E-u and Tha-nai pleased not the mind of the dragon,

The dragon looked on them,—the dragon beguiled the woman and Tha-nai.

How is this said to have happened?

The great dragon succeeded in deceiving—deceiving unto death.

How do they say it was done?

A yellow fruit took the great dragon, and gave to the children of God;

A white fruit took the great dragon, and gave to the daughter and son of God.

They transgressed the commands of God, and God turned his face from them.

They transgressed the commands of God, and God turned away from them.

They kept not all the words of God—were deceived, deceived unto sickness;

They kept not all the law of God—were deceived, deceived unto death."

The absence, in all their traditions, of any allusion to any thing peculiarly Christian, proves that they never had the New Testament among them; and that, if derived from a written source, those traditions must have come from the Old Testament alone. The Karens themselves say they were obtained from their ancient books of skin, which are praised as teaching morals, in contrast with the palm-leaf books, that treat of things to make men wonder. A poetical fragment before me, that has never been published, says:

"The palm-leaf book that is written in circles,
The book of palm-leaf that in circles is written,
The elders drew out the lines in long coils;
They became great winding paths;
The letters of the palm-leaf books
Teach ancient wonders;
The pages of the palm-leaf books
Show wonders of antiquity.
God sent us the book of skin;
It is at the feet of the king of Hades;
God sent us the book that has neither father nor mother,
Enabling every one to instruct himself.
The book of one-sided letters, the letters ten,
Is at the feet of the king of Hades;
The book of one-sided letters, of letters many,
All men could not read."

It has been recently ascertained that there have been Jews in China from time immemorial; and five years ago the missionaries there obtained from a few Jewish families at Khai fung-fu several copies of the Pentateuch, the only part of the Bible they seem to possess. The manuscripts are described as "beautifully written without points, or marks for divisions, on white sheep skins, cut square and sewed together, about twenty yards long, and rolled on sticks." Had these Jews, or their proselytes, been thrown among Buddhist nations, lost their Pentateuch, and seen no more books of skin, but only palm-leaf books, what more natural than to sing dirges like the above over its removal to Hades?

Many of the Karens are quite tenacious in the belief that they formerly had books of their own. In the September (1855) num-

ber of the *Morning Star*, is an article from the pen of a native assistant on this subject. He says,—" Brethren, I wish to speak to you plainly concerning one thing. It is not true that the Karen nation had no books. The elders of past ages said, one generation to another,—'Children and grandchildren, the Karens had books, perfect like other nations.' But they did not take care of their books, and therefore lost them. When they lost their books, they lost their knowledge of God; and when they lost their knowledge of God, they could no longer live in peace with each other. The younger brother became an enemy, the elder brother a foe. The more they lived in hostility, the more degraded they became; the more degraded they became, the shorter the period of life; the shorter the period of life, the more they did evil; the more they did evil, the more severe were the judgments of God, afflicting them the more with sickness and death. But the elders left one promise. They said,—'Though the Karen nation has deteriorated and increased in wickedness, yet love and compassion will come to them again; when love and compassion come to them again, if they observe and do, they will fraternize again into populous communities; when they fraternize again into populous communities, they will love each other and improve physically and morally.' Again, the elders said: 'Children and grandchildren, if you are enticed towards that which is black, follow not; if you are enticed towards that which is red, follow not. They are not the words and commands of your God. Before the word of your God returns to you, many will come, saying they are your God; but they are not your God. Look towards the ocean. The great bird shall ascend and spread forth its white wings. That is the white foreigners bringing you the words of your great eternal God.' The elders added: 'If you observe the words of your great God, which the white foreigners bring to you, you shall become acquainted with the righteousness of your God, and be able to discriminate between right and wrong; and when you are able to discriminate between right and wrong, you will dwell together again in prosperous communities as in the olden time; but if you neglect to observe, then will you remain in the same degraded state you are now in.'

"The words of the elders have been fulfilled in every particular. All things have happened as they said. The Karens do not love each other, so they live apart in small communities. One sets himself above another, and no one will submit to the will of his neighbour; so they live in the forests, like the pheasant and jungle fowl, one in one place and another in another place. The white foreign teachers have come with our books, according to the words of the elders, that we may live in cities and villages again, and rise."

Karen is applied to several distinct tribes united by the common bond of having one language, though spoken in widely differing dialects. The Sgaus are the most numerous tribe, and occupy the widest extent of country. They are found from Mergui in Lat. 12° N. to Prome and Toungoo in nearly Lat. 19° N. On the east, they have wandered over the water-shed that separates the Meinam from the Salwen, and on the west, a few have passed into Arracan. The Burmese denominate them sometimes "Burman Karens," but they call themselves Sgau until passing the Southern boundary of Toungoo where they assume the name of Mau ne pgha, and on crossing Meet nan creek, that term is dropped for Paku. The Pwos call them Shan, but do not confound them with the tribes denominated Shans by the English. These they call Thaing. The Sgau may be distinguished by his tunic, which is white with a few red horizontal parallel stripes near the bottom. With a few rare exceptions none of the Sgaus are Buddhists.

The Pwos are found scattered in the same regions as the Sgaus to a short distance above Sitang. They are a more muscular tribe than the Sgaus, and have almost universally adopted Buddhism.

Tradition says they emigrated South from the Paku hills, and this tradition is confirmed by the fact that the Paku dialect is much nearer the Pwo than the ordinary Sgau. The Burmese call them Talaing Karens, the Sgaus Pwo, but their own distinctive name is Sho. Pwo, however, their Sgau name, has been introduced into English by the missionaries. Their tunics are distinguished from the Sgau by being handsomely embroidered near the bottom.

The Pwos are much less numerous than the Sgaus.

On crossing Thouk-ye-khat, or Draw-drink-water creek, an eastern tributary of the Sitang, which comes in about six miles

south of Toungoo, the country is found to be inhabited by Bghais. Their limits on the north are not exactly known, but they are bounded on the east by the banks of the Salwen. They are much greater savages than the other Karen tribes, and are robbers and kidnappers by profession. None are Buddhists, but all are worshippers of Indra and stones. There are stones in every house, to which in connection with Indra, buffaloes, hogs or fowls are sacrificed, and blood poured on them with prayers. Bghai is the name given them by the Sgaus or Pakus. They have no distinctive name for themselves, each clan calling itself by the name that designates man, precisely like אָדָם in Hebrew, which signifies both man in general, and Adam, *the* man. The Karens consider themselves as *the* men, for all the tribes have the habit of characterising themselves in the same way. They consist, however, of two or three sub-tribes, one of which, the most civilised, is distinguished by wearing tunics or frocks, while all the rest wear short pants scarcely reaching half down the thigh. The tunic wearers have had different names given them by the Burmans in different localities. Some are called *Liek-by ga gie*, or "great butterflies," and others *Liek-by ga gnay*, or "little butterflies." The pant wearers are divided by the Burmese into the *Yaing* or wild Karens who inhabit the mountains on the east and north, and the red Karens who dwell farther east in the valley of the Salwen. They seem to me, however, to be essentially the same people. The "wild Karens" have red radiating lines wrought in their white pants near the bottom, as the rays of the rising sun are sometimes represented; and the red Karens are said to have their pants all red, or the red lines parallel; but all the red Karens I have met wore the Shan blue pants; and some of those had the radiating lines tattooed on their backs which they exhibited as their coat of arms with considerable pride; and indeed with one or two wild beasts from their forests, for supporters, it might be worked into a very respectable escutcheon.

The Sgaus, Pwos, and Bghais are the principal Karen tribes, but there are two or three smaller ones. The Mopghas occupy the secondary range of hills between Thouk-ya-khat and Kannie, red bank, creeks, whose mouths are about eleven miles apart, the latter falling into the Sitang five miles north of Toungoo. There are not

more than ten or twelve villages left of the whole tribe. They have some indistinct traditions of having been much larger formerly, but were reduced by wars. They skirt the Bghais on the west, and their dress cannot be distinguished from the tunic-wearers; nor have they any distinctive mark except their dialect. A few of the villages call themselves Mopgha, while others know no name for themselves but the word for man. The Burmans have different names for them, some being *Tau bya gie* or "great Bees," and others *Tau bya gnay* or "little Bees."

There is a small tribe that the Burmese call Tounggthus, from *toung* south or mountain, and *thu* person, signifying either southerners or mountaineers. They call themselves *Pa-au;* in some sections they are known only as pediars, but in province Amherst and Pegu a few are settled in villages. The natives inform me that large numbers are settled on the north-west boundary of the Red Karens. They do not consider themselves Karens, but their language is nearly allied to that of the Pwo Karens, like them they are Buddhists, and they are a muscular tribe like the Pwos; but in dress they cannot be distinguished from the Shans. They claim Thatung, the old Talaing capital, as one of their ancient cities, and Bugdagautha, who first brought the Buddhist scriptures from Ceylon, as their countryman, but on no good grounds.

Quala, when among the red Karens, met with a tribe from the north who were called *Taru*, nearly the Karen pronunciation of Tarouk, the Burmese name for the Chinese. They shave the head leaving a tuft of hair on each temple. Besides their numerals, he noted down about twenty words, nearly all of which indicate a common origin with Karen. They are reported numerous north of the Red Karen country.

The Karen Language.

The Karen language is distinguished from the Tai, the Talaing and the Burmese, the other independant tongues of farther India by possessing the Arabic sounds of غ ghain, ع ain, and خ kha, and by being nearly destitute of the initial gutteral imperfectly represented by *ng*, found in the other languages. It is remarkable, however, that these Arabic sounds are most common in Pwo and Sgau. In Bghai they are found in very few words, especially the first.

The Karen is remarkable for using words in pairs, in the signification of one of the two. Thus *nau* or *nang*, grass, takes for its couplet *mie* or *meing* wild [things] hence.

(1) *Klau* [weed,] *nau, klau mie*, weed the grass.
(2) *Klau nau mie*, „ „
(3) *Klau nau*, „ „

where the three forms have by usage the same signification, though literally they read,—

(1) Weed the grass, weed the wild [things.]
(2) „ „ the wild [things.]
(3) „ „

The couplet of *pho* child, is *lie* grand-child, and a story commences: "There was a man and his wife in former times, and they had no *pho* no *lie*," where *pho* alone would give the same signification.

An old man, before the fall, is represented as walking through the forest with his daughter behind him, whom he warns not to pluck the leaves from the trees. He says, "If you pluck the leaves and throw them down, they will become *kaseu*, they will become *kalo;* and when *kaseu kalo* come into existence, travelling will become very wearisome." Here *kaseu* is the significant word for mountain and *kalo* is the couplet.

Again he says, "If you throw down the leaves, they will become *paumu*, they will become *paulay*," where *paulay*, signifying sea or ocean, is the significant term.

The paired word is often chosen from some resemblance or association with the significant term, as:

Ta-u, takhie, cloud, darkness, for *ta-u* cloud.
Takhie, tana, darkness, night, „ *takhie* darkness.
Die, nya, frog, fish; „ *nya* fish.
Taphie, tanya, skin, flesh „ *tanya* flesh.
Htwie, hto, dog, hog „ *htwie* dog.
Hto, hsau, hog, fowl „ *hto* hog.
Thama, payo, crocodile, dragon „ *thama* crocodile.
Hteu, shie [Bghai] bird, fowl „ *shie* fowl.
Me, htie boiled rice, water „ *me* boiled rice.
Thwie, htie blood, water „ *thwie* blood.

Khlie, tha seed, fruit „ *tha* fruit.
Me-oo, phahsa fire, ashes „ *me-oo* fire.
May, hau sand, earth „ *may* sand.
Khoolau, bleulau, dig, immerse „ *khoolau* dig.
Miemau, plauthau, dream, be in a reverie „ *miemau* dream.
Ay, kwie love, covet „ *ay* love.

Sometimes the couplet is a foreign word signifying the same thing, as

Klau, nwa, the bos genus, where *nwa* is Burman.
Htie, noung, water „ *noung* is the Siam *nam.*
Heuphlong, heukhaung man „ *khaung* „ „ *khon.*
Ta-u, tamyau, monkey „ *myau* is Burman.
Mauhtau, para, pagoda „ *para* „
Apo, àhau, to speak „ *hau* „

Occasionally the secondary word appears to have been chosen for euphony, as

Phomu, phomeu, daughter, where *meu* has no signification.
Lie, lay, book „ *lay* „ „
Tamu, tala happiness „ *la* „

Sometimes a couplet regarded as destitute of signification, proves, as our knowledge of the language extends, to be a siguificant word, thus:

Htsoo the couplet of *hsa* to be sick, was regarded as of no signification until the Bghai was acquired, where it signifies fever. So *la* the couplet of *ta-kapau*, or *hseuphang* light, is probably the Bghai *lie.*

This feature of the language suggests a probable etymology for many words; thus *le way* word, where *way* the non-significaut term is probably of commou origin with the Sanscrit वच्

The dialects exhibit some singular irregularities in the use of the personal pronouns. At Tavoy, *sá* or *seu* is the first personal pronoun, singular number in Sgau aud is in much more common use than *ya* or *yeu*, which is also used; but in Bghai it is the third personal pronoun, singular aud plural, he, she, it, they; and is used exclusively in some Sections, but a few villages near the Pakus use *wa.*

In Sgau and Bghai *nay* is the second personal pronoun singular, thou, thee; but in Mopgha it is the plural number of the same person, you.

In Pwo, *thie* is a particle marking the plural number of the second and third persons when affixed to the singular; but in Bghai it is an independant pronoun, the second person plural, you.

In Mopgha, the first personal pronoun singular *ya*, on being used as a possessive is changed to *ei*, pronounced precisely like the English I.

Objective forms for the third person, *au*, *eu*, and *sai* are peculiar to Karen as compared with the languages of other tribes.

The following table exhibits the pronouns in all their forms, in the various dialects.

	Case Absolute. I as to me.	*Nominative I,*	*Objective me*	*Poss. Pron. my.*
Sgau	Yá, or yay	Ya, yeu seu	Yá or yáy	As nominative.
Pwo	Yeu, or yawe	Ya, or yeu	Yeu	„ „
Bghai	Yay	Ya	Yay	„ „
Mopgha	Zá	Za	Zá	Ei
Toungthu		Khwa		

	Thou as to thee	*Thou*	*Thee*	*Thy*
Sgau	Ná, or nay	Na, or neu	Ná	As nominative
Pwo	Neu, or nawe	Na, or neu	Neu	„ „
Bghai	Nay	Na	Nay	„ „
Mopgha	Ná	Na	Ná	„ „
Toungthu	Ná	Na	Ná	

	As regards &c.	*He, she, it, they*	*Him, her, it, them*	*His, her, its, their.*
Sgau	Away	A, or way	Au	A.
Pwo	Awe	A, or we	Eu	A.
Bghai		So, or wa	Say	A, or Sa.
Mopgha		O, or wo		
Toungthu		Wa		

	Case Absolute. We, as regards us.	*Nominative We*	*Objective Us.*	*Poss. Pron. Our.*
Sgau	Pa way	Pa, or peu	Pgha	As, Nomin.
Pwo	Pa we	Pa, or Peu	Peu	,,
Bghai	Kay	Ka	Kay	,,
Mopghai	Kay	Ka	Wau	Oo, or Ei.
Toungthu		Ne		

	You, as regards you.	*You*	*You*	*Your.*
Sgau	Thu way	Thu	Thu	As, Nomin.
Pwo	Nathie	Nathie	Nathie	,,
Bghai	Thie	Thie	Thie	,,
Mopgha	Nay	Nay	Nay	,,
Toungthu	Nathie	Nathie	Nathie	

The third person plural is the same as the singular.

DIALECTS.

The Sgau and Bghai have no final consonants, but Pwo, Mopgha, and Toungthu have them.

Sgau and Pwo. The most marked characteristic of Pwo is a final nasal *ng* where the roots in Sgau, and most of the other dialects have final vowels; as

Sgau,	*Te*	To form, create,	Pwo,	*Taing.*
,,	*Nie*	Margin	,,	*Naing*
,,	*Hse*	A tunic	,,	*Hsaing.*
,,	*E*	To bite	,,	*Aing.*
,,	*Htau*	To ascend	,,	*Htang.*
,,	*Lau*	,, descend	,,	*Lang.*
,,	*Miemau*	,, dream	,,	*Miemang.*
,,	*Ghau*	An image	,,	*Ghang.*
,,	*Phau*	To cook	,,	*Phang.*
,,	*Khlau*	To heat	,,	*Khlang.*
,,	*So*	Power	,,	*Saung.*
,,	*Kho*	Land	,,	*Khaung.*
,,	*Thu*	The liver	,,	*Thung.*
,,	*Loo*	To follow	,,	*Laung.*

Pwo often takes an aspirate where Sgau has a smooth mute, as

Sgau	*Ka*	To break	Pwo	*Kha.*
„	*Ko*	To be hot	„	*Kho.*
„	*Ku*	„ eat	„	*Khuk.*
„	*So*	„ carry	„	*Hso.*
„	*Too*	„ receive	„	*Htong.*
„	*Plo*	The spine	„	*Phlo.*
„	*Pla*	To dismiss	„	*Phla.*

A middle or flat mute in Sgau, often becomes a rough or smooth mute in Pwo, as.

Sgau,	*Die*	The cucumber,	Pwo,	*Htie.*
„	*Ble*	To be smooth	„	*Phle.*
„	*Bghie*	To rest	„	*Pwie.*
„	*Dway*	The grasshopper	„	*Htway.*
„	*De*	A branch	„	*Htaing.*

Occasionally it is the reverse, as :

Sgau,	*Tau*	To strike	Pwo	*Do.*
„	*Htie*	To see	„	*Da.*

A formative smooth mute in Sgau is often wanting in Pwo, as :

Sgau,	*Kana*	To listen	Pwo	*Na.*
„	*Kale*	The kidneys	„	*Le*
„	*Kaman*	„ spleen	„	*Mang.*
„	*Kamu*	Dust	„	*Mu.*
„	*Kateu*	End	„	*Htu.*
„	*Kapie*	Mud	„	*Phie.*
„	*Mukanau*	A maiden	„	*Munang.*
„	*Sakho*	The mango	„	*Kho*
„	*Thapeu*	A chatty	„	*Phung.*
„	*Thadie*	The gall bladder	„	*Die*

The Sgau *ny* is not found in Pwo, Y usually supplying its place ; as

Sgau,	*Nya*	Before	Pwo	*Ya.*
„	*Nyau*	To be easy	„	*Yau.*
„	*Kanyau*	To refuse	„	*Kayang.*
„	*Thakanyau*	Mercy	„	*Yangtha.*

The letter *H* in Sgau often becomes gh in Pwo, as:

Sgau	*Ha*	To walk	Pwo,	*Gha.*
„	*Hà*	Evening	„	*Ghà.*
„	*Han*	To weep	„	*Ghang.*
„	*Hu*	„ steal	„	*Ghu.*
„	*He*	„ hate	„	*Ghain.*

Bghai. While Bghai coincides with Sgau in all its words ending in vowels it differs from it, as well as the Pwo, in introducing a large number of new words, as:

Bghai	*Die*	Year	Sgau	*Nie.*
„	*Hooklaypoo*	Field	„	*Khu.*
„	*Khauklay*	Door	„	*Tray.*
„	*We*	Margin	„	*Nie.*
„	*Awayway*	Another	„	*Agha.*
„	*Way*	An insect	„	*Kha.*
„	*Nay*	Self	„	*Tha.*
„	*So*	A slave	„	*Ku.*
„	*Tapheu*	Fish	„	*Nya.*
„	*Twie*	A net	„	*Pgha.*
„	*Datheu*	A basket	„	*Ku.*
„	*De*	Boiled rice	„	*Me.*
„	*Peu*	A large fish net	„	*Sa.*
„	*Tayyautayya*	An image	„	*Taghautaphau*
„	*Mahtau*	A pagoda	„	*Kho.*
„	*Lookheu*	A grave	„	*Thwakho.*
„	*Klie*	Soldier	„	*Thu.*
„	*Kiekay*	Evil	„	*Eu.*
„	*Khauway*	Sin	„	*Tadayba.*
„	*Khauwayma*	Hell	„	*Lara.*
„	*Lie*	Light	„	*Kapau.*
„	*Kway*	To pour	„	*Gha.*
„	*Khoo*	To be bold	„	*Doo.*
„	*Khau*	To be wide	„	*Lay.*
„	*Khyie*	To appoint	„	*Thepa.*
„	*Wie*	„ fly	„	*Yoo.*
„	*Weu*	„ bark	„	*Mau.*
„	*Wephlau*	„ throw away	„	*Kwiete.*

Bghai	*We*	To wither	Sgau	*Khe.*
„	*Suba*	„ wash,	„	*Thesau.*
„	*Sa*	„ look	„	*Kwa.*
„	*Eumiesa*	„ think	„	*Hsokamo.*
„	*Seu*	„ be cool	„	*Khu.*
„	*Sway*	„ run	„	*Khe.*
„	*Chu*	„ perspire	„	*Kapeu.*
„	*Shieshay*	„ fear	„	*Phlie.*
„	*Oosha*	„ bathe	„	*Ln.*
„	*Shie*	„ meet	„	*Thagheu.*
„	*Shuy*	„ be warm	„	*Khlau.*
„	*Shaumieta*	„ forget	„	*Thapienau.*
„	*Zay*	„ heal	„	*Bla.*
„	*Dje*	„ laugh	„	*Nie.*
„	*Taplau*	„ ride	„	*Do.*
„	*Taie*	„ testify	„	*U.*
„	*Ata*	„ ask	„	*Khe.*
„	*Na*	„ be straight	„	*Lo.*
„	*Htie*	„ throw a net	„	*Hu.*
„	*Hteu*	„ be heavy	„	*Kheu.*
„	*Pa*	„ „ difficult	„	*Khau.*
„	*Hto*	„ anoint	„	*Phghoo.*
„	*Deubayyaba*	„ reverence	„	*Yooyau.*
„	*Na*	„ have capacity	„	*Trau.*
„	*Pgha*	„ found	„	*Thoo.*
„	*Shauie*	„ watch	„	*Kho.*
„	*Hau*	„ reprove	„	*Doo.*
„	*Khoo*	„ be fierce	„	*Doo.*
„	*Botha*	White	„	*Wa.*
„	*Ayehayna*	Well	„	*Kasaudau.*
„	*Shotabla*	Around	„	*Watarie.*
„	*Na*	Causative particle	„	*Meu.*
„	*Ba*	Affix of perfect tense	„	*Lie* [Pwo *youk*

There are many other words in common use differing as much as the above.

It is remarkable that *yuwà*, the name for the god who created the heavens and the earth and all things, is known to a part of the Bghais only; and those use it with a prefixed *ta*, and always with the adjective *deu* great affixed, making it *tayuwàdeu*. The pant wearing Bghais on the north tell me they use *Khwekhwà deu* for the same being; and a couple of young men who recently visited the Bghais near our north east frontier, report *Teu mau* as used for *yuwà*. Quala says that the greatest difficulty he found in addressing the Bghais in his journey to the Red Karens was his inability to discover the name they gave to *yuwà*. The name for Satan is subject to like variations. In Sgau it is *Mukaulie*, in Pwo, *Mukaulaing*, and the name I have adopted in Bghai, as being best known to those who will read the books, is *Htoo way khay*, but there are several other names, as *Modielie* the same word by which they designate the gecko, and *Mopraymu*. Adam whom the Sgaus call *Thanay*, some of the Bghais call *Ayrabay;* and the Sgau *ie-u* for Eve they change to *Mora*.

The Bghai is remarkable for hissing dentals. The people speak with their teeth closed when pronouncing many words, and but slightly apart when uttering others. *Hs*, very common in Sgau and Pwo, has no place in the dialect, being changed to *sh*. The Bghai has several consonant sounds as *g*, *j*, *z*, and a peculiar hissing *dj* that cannot be adequately represented by English letters, which are not found in the southern dialects.

The Sgau *gh* often becomes *wa* in Bghai, as:

Bghai	*Wie*	To enumerate	„	*Ghie.*
„	*Woo*	A serpent	„	*Ghu.*
„	*Awoo*	Use force	„	*Ghoo hsoo.*
*„	*We*	Gash, cut	„	*Ghay.*
„	*We*	Concerning	„	*Ghe.*
„	*We*	Ratan	„	*Ghe.*
„	*We*	Good	„	*Ghe.*
„	*Way*	To rise	„	*Geay.*
„	*Wau*	Cold	„	*Gho.*

* These words, though alike here, are distinguished by intonation in the printed Karen.

While the Pwo adds to the aspirates in Sgau, the Bghai sometimes takes a flat mute where there is an aspirate in Sgau, as:

Bghai	*Kookeu*	Head,	Sgau,	*Kho.*
„	*Kà*	Behind	„	*Khie.*
„	*Kauthoo*	Secret	„	*Khoothoo.*
„	*Kau*	Future	„	*Khay.*

The Pwo prefix *ang* to some active verbs, and which has ordinarily no representative in Sgau, becomes *à* in Bghai, as:

Bghai	*A' shay*	To sell	Pwo,	*Anghsa.*
„	*A' she*	To beat in a mortar	„	*Anghsoo.*
„	*A' woo*	„ take by force	„	*Angghook.*
„	*A' thateu*	„ send	„	*Angmeung.*
„	*A' hoo*	„ steal	„	*Angwoo.*
„	*A' lo*	„ borrow	„	*Anglaung.*
„	*A' pha*	„ cook	„	*Angphaung.*

The Sgau vowel *au* often becomes *à* in Bghai, as:

Bghai	*La*	To descend	Sgau,	*Lan.*
„	*Hta*	„ ascend	„	*Htau.*
„	*Kha*	Foot or leg	„	*Khau.*
*„	*Da*	To chop	„	*Dau.*
„	*Da*	To be shallow	„	*Dau.*
„	*Na*	Area	„	*Nau.*
„	*Lapgha*	Fall in ruins	„	*Laupghau.*
„	*Lasha*	To be different	„	*Lauhsau.*
„	*Khà*	Only	„	*Khau.*

The Sgau vowel *à* is often *ay* in Bghai, as:

Bghai,	*Khay*	To step	Sgau	*Khà.*
„	*Pay*	Side	„	*Pà.*
„	*Say*	To be weak	„	*Sà.*
„	*Bay*	To hit	„	*Bà.*
„	*Nay*	Night	„	*Nà.*
„	*Ay*	Many	„	*A'.*
„	*Play*	A cubit	„	*Plà.*
„	*May*	To make	„	*Mà.*

* Distinguished by intonation.

The vowel *eu* is a favorite in Bghai. It takes the place of several Sgau vowels, as:

Bghai	*Theu*	A tree	Sgau	*The.*
„	*Meu*	The sun	„	*Mu.*
„	*Meu*	The eye	„	*May.*
„	*Seu*	A corpse	„	*So.*
„	*Hteu*	High	„	*Htau.*

The most remarkable distinction is found in the numerals. The names for the first five are almost identical with the Sgau, but:

Six	is	*theu*	*tho*	literally	Three-two.
Seven	„	„	„ *ta*	„	Three-two-one.
Eight	„	*lwie*	*tho*	„	Four-two.
Nine		„	„ *ta*	„	Four-two-one.

The language of the Mikirs in Arracan, has something similar; there

Seven	is	*thor-chie*	literally	Six	one
Eight	„	*nu-kep*	„	Two	ten i. e. 10—2
Nine	„	*chi-kep*	„	One	ten i. e. 10—1

There is nothing parallel in any of the languages or dialects spoken around.

There are a multitude of sub-dialects in the Bghai, every village boasting of possessing some peculiarity in its language. In one the letter *tha* is unknown, *ta* being always used in its place; and in one day's walk I have found the common word for speak to be changed from *apo* in the morning, to *hie* at noon, and then back towards the Sgau to *katau* at eve.

Mopgha. The Mopgha introduces several new letters into Karen, some of which, if not all, are found in Shan.

It has a peculiarly strong *f*, uttered with a forcible emission of the breath; as

Mopgha	*Feu*	A child, or son,	Pwo	*Pho.*
„	*Feu*	To fly	„	*Youk.*
„	*Fu*	A bird	„	*Hto.*
„	*Fo*	Head	„	*Kho.*

It has both an initial and final *v* passing into *f* in one of the sub-dialects ; as :

Mopgha	*Vuv*	To offer	Pwo	*Boung.*
„	*Veu*	„ make an end	„	*Louk.*
„	*Vedz*	„ guide	„	*Thoung.*

There is a final *dz* in Mopgha, not found in the other dialects, as ;

Mopgha	*Pudz*	To instruct	Pwo	*Thoung.*
„	*Hsiedz*	„ seize	„	*Phie.*
„	*Lapodz*,	the spider	„	*Khan.*

Several words which are formed of *m* followed by a vowel in the other dialects, have the same consonant preceded by a vowel in Mopgha, as :

Mopgha	Pwo	Sgau	Bghai	
Am	*Mo*	*Mo*	*Meu*	Mother.
Em	*Meing*	*Mie*	*Mie*	Name.
Um	*Muk*	*Mu*	*Mau*	Happy.
Lem	*Mung*	*Thamu*	*Thamo*	Live.

When these words are preceded by another word with an inherent vowel, the inherent vowel is dropped and the consonant is united with the vowel of the root, as :

Za	my,	and	*am*	mother, become	*Zim*	my mother.
Na	thy,	„	„	„ „	*Nam*	thy „
Na	thy,	„	*umpo*	musket „	*Numpo*	thy musket.

When the first word is followed by a distinct vowel, the initial vowel of the second word is dropped ; as :

Kay	our,	and	*am*	mother, become	*Kaim*	our mother.
Nai	your,	„	„	„ „	*Naim*	your „

Words with a final *v* are subject to the same rules, as :

Latu	a city	*av*	in, become	*Latuv,*	in the city.
Panay	buffalo	„	„ „	*Panaiv*	in a buffalo.

The Mopgha has a peculiar hissing sibilant which seems to take the place of *hs* in the other dialects ; *th* is wanting, being changed to *t ;* and *z* takes the place of *y*. Altogether it is the most peculiar of the Karen dialects, and yet is spoken by not more than two thousand people, who speak it in two or more well marked sub-dialects.

Toungthu. The Toungthu, or Pa-au dialect has a *v* not found in Sgau or Pwo, but with this exception, it is nearly related to the Pwo with an occasional deviation towards the Bghai. No attention however has been given to the dialect, beyond the collection of a small vocabulary of words that I made half a dozen years ago, and which was published, with some typographical errors, by Mr. Hodgson in the Journal of the Asiatic Society of Bengal, No. 1, 1853, under the name of Toungthoo and credited to Dr. Moreton. It will be found corrected in my vocabulary of the dialects at the close of this paper.

Taru. All known of this dialect is the few words collected by Quala, and given below, except the numerals which will be found in the vocabulary. The numerals show the nearest affinity to the Pwo, and are most remote from the Bghai.

Taru	*Moo,*	Heaven	Sgau	*Mookho.*
,,	*Haloo,*	Earth	,,	*Haukhoo.*
,,	*Pamo*	Woman,female	,,	*Pomu.*
,,	*Pakho*	Man, male	,,	*Pokhwa.*
,,	*Takho*	Child	,,	*Phothakhwa.*
,,	*Tieta*	Salt	Bghai	*Ie-ta.*
,,	*Kle*	A road	Sgau	*Klay.*
,,	*La*	Leaf	,,	*La.*
,,	*Ta*	Fruit	Bghai	*Ta.*
,,	*Poola*	Betel leaf	Pwo	*Phula.*
		,,	Bghai	*Thapoolay.*
,,	*Mamoote*	Areca nut	,,	*Mamoota.*
,,	*Gnwa*	The mouth	Pwo	*No.*
,,	*Lakan*	The nose	Bghai	*Naykhede.*
,,	Say	Boiled rice	Sgau	*Me.*
,,	*Zoo*	A house	Bghai	*He.**
,,	*Te*	To return	Pwo	*Taing.*
,,	*Hswa*	,, come	Bghai	*Sway* to run.
,,	*Phoo*	Good	,,	*We-bay.*

* In some of the Bghai sub-dialects the *h* is pronounced as if passing into *z*.

The Vocabulary.

The following vocabulary contains the words which have been selected by Indian philologists to develope the affinities and differences of languages. In the Journal of the Asiatic Society of Bengal, and in the Journal of the Indian Archipelago, Hodgson, Logan and others have published the same words in all the known languages from Australia to Siberia, and from the Yellow Sea to the Black. With these the Karen may now be compared in all its known dialects. The couplets have been added occasionally, but to have inserted them in every instance would have subserved no useful purpose.

English	*Sgau*	*Pwo*	*Bghai*
Air	Kalie	Lie	Kalie.
„ coup.	Thanghau	Lang	Waythra.
And	Dau	Day	Lay.
Ant	Teu	Htung	Teu.
Animal	Taphotaḳha	Hseuphohseukha	Taypheutayway.
Arrow	Pla	Phla	Play.
Bad	Eu	Eung	Kiekay.
„ coup,	Thau	Thaung	Meulay.
Beautiful	Aḳhieala	Aḳhieala	Apeubayaghawe.
Bee	Kanay	Ne	Kane.
Believe	Na	Nay	Nay.
„ coup.	Soo	Soo	Zoo.
Belly	Heupheu	Ghoophoug	Kaphoo.
„ coup.	Heukho	Thaphong	Thaphoo.
Bird	Hto	Hto	Htubapheu.
„ coup.	Lie	Lie	Htubashay.
Bitter	Kha	Kha	Khay.
Black	Thoo	Theung	Lay, or thieche.
Blood	Thwie	Thwie	Thwie.
Boat	Khlie	Khlie	Khlie.
„ coup.	Hto	Htaung	Kapay.
Bone	Khie	Khwie	Khwie.
Book	Lie	Liek	Sai.
Bow			
Boy	Phothakhwa	Phothakhwa	Pheuthaykheu.
Brass	Tobau	Htoungbang	Kreba.
Bring	Has no independant root, but is made from two signifying literally *come-carry*.		
Broad	Lay	Lay	Khau.
Buffalo	Pana	Pana	Panay.
Burn	There are several specific words for this generic one.		
By. Ins.	Leu	Leu	Lay.

Mopgha	*Toungthu*	*Remarks*
Lalie	Talie	Siam, *Lon.*
		Koreng, *Tinghuu.*
Lay	La	Bur. *lay* Talaing *la.*
Hten	Htung	
Tafeutakha		
Pla	Pla	Koome, *pala* Shan, *pen.*
En	Kay	Compare Greek κ α κ ὶ α,
To		
Akheaghaughe tara		
Lane		
Nam		
Num		
Pan		
Teubo	Awa	Limbu, *bu.*
Teuba		
Kha	Kha	Bur. *kha* Shan *khou.*
Tuk	Phren	Shan *lau.*
Sweit	Thwe	Tibetan *thak.*
Hlick	Phre	Bur. *hlay.*
		This couplet signifies by itself *a raft.*
Hteu		
Khie	Hsot	Shan *sot* Chin. *kuh, a kweh.*
Sa	Sa	Bur. *sa,* Talaing, *leik.* Chin. *shoo.*
		Bow differs from boat in the intonation only.
Feuta		
Teugwa	Toung	Brass and copper are made from the same generic root with the adjective yellow and red affixed.
Lay		
Lana	Pana	

Which one could be compared legitimately with the other vocabularies is impossible to conjecture.

Lay

English	*Sgau*	*Pwo*	*Bghai*
Call	Ko	Ko	Yeu.
„ coup.	Yu		
Cat	Thamieyau	Meinyau	Mieyaukau.
Cheek	Bo	Nopahtie	Bau.
Child	Photha	Photha	Piesaypeu.
Chin	Kha	Kha	Khay.
Cloud	Taeu	Hseueung	Tayeu.
Cold	Gho	Ghaung	Wau.
Come	Hay	Ghay	Le, or ge.
Country	Kau	Khang	Ka.
Copper	Toghau	Htoungwau	Krieba.
Cow	Klau, or po	Khlau	Peu.
Crooked	Ke	Kaing	Ke.
Crow	Sauwakha	Kla	Sowa.
Dark	Khie	Khie	Khie.
Daughter	Phomu	Phomu	Pheumu.
Day	Nie	Nie	Nie.
„ coup.	Thau	Thoung	Thay.
Deaf	Nataeu	Naeung	Naykootaeu.
Deer (samber)	Takhau	Hseukhau	Kheu.
Demon	Tana	Hseuna	Taynay.
„ coup.	Tawie	Hseupho	Taykaphoo.
Die	Thie	Thie	Thie.
Dig	Khoo	Khung	Khoo.
Dog	Htwie	Htwie	Htwie.

	Mopgha	*Toungthu*	*Remarks*
	Zeu	Tom	Chin. *yerieh.*
	Miezau	Nyoo	Chin. *miau.*
	Bo		
	Feu		
	Kha		Sans. चिवि *chivi.*
	Taeu		The *ta, hseu, tay* prefixed to this and many other roots is the same formative particle.
	Ghau	Khwa	Shan. *kat.*
	Hay	Lon	Chin. *lay* and *kwoh.* The Bghai has no distinct word for come, but uses *le* go, or *ge* return, for it.
	Kho		
	Kriebo	Htoung	
	Peu	Phou	Comp. *klau* with गो ; *peu* with *bos.* Tibetan *ba.*
Crooked	kay	Nga keu	
Crow	Sagwa	Zanká	
	Khie		
	Feu meu		
	Ne	Ya	Bur. *ne* Bur. *yet,* embraces both the night and day.
	To		This couplet designates the Bur. *yet.*
	Nalaeu		
	Hseu		
	Tana		
	Tapoo		
	Tei	The	Chin. *se.*
	Khau		Sans. खन.
	Htwie	Htwie	Mru. *takwie.*

English	*Sgau*	*Pwo*	*Bghai.*
Drink	Au	Au	Au.
Duck	Htode	Htohta	Oopayde.
Ear	Na	Na	Naykoo.
„ coup.	Nu	Noug	Naykau.
Earth	Haukho	Ghangkho	Lakheu.
East	Muhtau	Muhtaung	Muhta.
Eat	Au	Ang	A
Egg	Die	Die	Die
Elephant	Kahsau	Kahsaung	Kasha
Eye	May	Me	Meuladoo.
End, consume	Leu	Louk	Leu.
Enter	Nu	Nu	Nu.
Fat	Bau	Baung	Bau.
Father	Pa	Pha	Pa, or ta.
Flat	Beba	Papay	Bieba.
Fever	Nyagho	Hsooghouk	Shwie, or shoo.
Few	Sgha	Sha	Shie.
Fight	Du	Du	Du.
Fire	Meoo	Meeung	Me.
Fish	Nya	Ya	Tapeu.
Finish	Wie	Ghoung	Wa.
Form, make	Te	Taing	Bau.
Flower	Phau	Phan	Phau.
Fly	Yu	Yoo	Wie.
Foot	Khau	Khang	Kha.
Forest	Pgalakla	Meinglakla	Sapoklay.
Frog	De	De	De.
From	Leu	Leu	Leu.
Give	He	Pe	Ie.
Go	Lay	Le	Le.

	Mopgha.	*Toungthu.*	*Remarks.*
	Oo	Awa	
	Haupay		
Ear	Na	Na	Singpho *na.*
	Nu		
Earth	Hau feu,	Hamtan	
	Meuhto		Lit. *sun-ascend.*
	Au	Am	The Sgau *eat* and *drink*, are distinguished by inonation.
	Dei	Die	Mru. *dui.*
	Lahso	Hsan	Shan. tsang. Chin. *siang.*
	May	May	Shan. *matta*, Chin. *moh.*
	Veu		
	Lieum		
	Bay	Bay	
	Pa	Pha	
	Bayba	Sampya	
	Shwie		
	Sha		
	Du		
	Meouk	Me	Botia. *me.*
	Za	Hta	Shan. *pa* Chin. *yu.*
	Wa		Chin. *wan.*
	Bu		Chin. *tuon.*
	Foo	Heu	Limb. *phu.*
Fly	Fu		Chin. *fei.*
	Khau	Khan	Tibetan. *kang.* Foot and leg are made from the same root.
	Khuklavu		
	Dei		
	Leu		
Give	He	Pha	Shan. *pan.* Bur. *pay.*
	Le	Lway	Sunawar. *lau.*

English.	*Sgau*	*Pwo*	*Bghai*
Girl	Pothapomu	Phothamu	Piesaypheupheu-mu.
Goat	Maytaylay	Be	Paykolay.
God	Yuwa	Yuwa	Tayuwa.
Gold	Htoo	Htaung	Htway.
Good	Ghe	Ghe	We.
Guide	Sgheu	Thoung	Thay.
Great	Do	Do	Deu.
Hair	Khothoo	Khothoo	Kheuloo.
Hand	Su	Su	Su.
Happy	Mu	Mu	Mau.
Hard	Ko	Naung	Ma or ko.
Head	Kho	Kho	Kookeu.
Hear	Nahoo	Nagheung	Shaunay.
Heart	Tha	Tha	Tha.
Heaven	Mookhoo	Mookhoo	Maukheu.
Hell	Lara	Lara	Khauwayma.
Here	Phayie	Htaungyo	Dauyeu.
High	Htau	Htau	Hteu.
Hog	Hto	Hto	Htau.
Horn	Neu	Nong	Neu.
Horse	Kathe	Kathe	Thie.
Hot	Ko	Kho	Keu.
House	Hie	Ghaing	He.
Hunger	Tathawie	Hseuthawie	Taythawie.
Husband	Wa	Wa	Wa.
In	Leupoo	Leupeung	Leupoo.
Iron	Hta	Hta	Htala.
Ivory	Kahsaumay	Kahsaungmay	Kashathro.
Kill	Mathie	Mathie	Maythie.
King	Saupa	Sakhwa	Shaparga.
„ coup.	Saulo	Salong	Shadeu.

	Mopgha	*Toungthu*	
	Feumeu		
	Piekoolay	Bay	Shan. *pa.*
	Layuwa		
	Teu	Khan	Chin. *kin*, and *kum.*
	Ghe	Heu	
	Vudz		
Great	Deu, and vu	Tan	Chin. *ta.* Tai *di.*
	Feuhtook	Taloo	
	Sook	Su	Chin. *syu.* Hand and arm are made from the same root.
	Um		
	Ma	Ma	Bur. *ma.*
	Feu, or kho	Katu	Bur. *khoung.* Shan *ho.*
	Nahoo	Heun	
Heart	Ta		
	Maufeu		
	Lara	Lara	Sans नर.
	Phayie		
	Hto	Hto	
	Htook	Htau	Chin. *tehee.*
	Nau	Nung	
	Lagho	Tha	Botia *ta.* Aka. *ghura.*
	Ko	Kheu	
House	Heik	Lam	Shan. *hien.*
	Tawaime	Hookho	
	Wa		
	Leupo	Poo	The *leu* precedes the noun, while *poo* is affixed.
	Htala	Pathie	
	Lahsome		Literally, *elephant-tooth.*
Kill	Mateik	Mathie	Literally *make-death.*
	Sobaro		Bur. *shenbuyen.*

English.	*Sgau*	*Pwo*	*Bghai*
Kiss	Neumoo	Neungmeung	Numau.
Laugh	Nie	Nie	Dje.
Law, (moral)	Tatho	Hseuthaung	Tadauoo.
coup.	Tathau	Hseuthang	Shauoo.
„ civil	Kwau	Khaung	Beu.
coup.	Beu	Htwe	Kwa.
Lead	Pgha	Sha	Pa.
Leaf	La	La	Lay.
Leg			
Little	Hsie	Pe	Shie.
Live	Moo	Meung	Thamo.
Lift up	Sauhtau	Hsahtang	Sahta.
Light	Kapau	Phang	Lie.
Lightning	Lauwaadie	Langwaadie	Lawanadie.
Lord	Kasa	Kahsa	Biesay
Loom	Hta	Hta	Hta.
Long	Htau	Htau	Hta.
„ distant	Yie	Yaing	Djie.
„ in time	Yie	Yie	Djie.
Man	Pghaknyau	Heuphlong	Pieya.
„ coup.	Pghathapleu	Heukhong	Pieyeu.
Medicine	Kethie	Thie	Thaukhwie.
Milk	Nuhtie	Mhte	Nuhtie.
Moon	La	La	Lay.
Morning	Mughau	Mughau	Muhau.
Mother	Mo	Mo	Meu.
Mountain	Kaseu	Kholaung	Khaumu.
„ coup.	Kalo	Htounglo	Hhaulau.
Mouth	Htakho	No	Lamau.
Musquito	Paso	Paso	Paso.
Name	Mie	Meing	Mie.
„ coup.	Tha	Tha	Thay.

	Mopgha	*Toungthu*	*Remarks*
	Neumuk		Literally *smell-happy.*
	Ne	Nga	Murmi *nya.*
	Tato		
	Tatau		
	Beu		
	Sheu		
	Pgha	Soon	
	La	La	
			See foot. Chin. *kiah.*
	Hseik		
	Moo, and liem		
	Sotau	Hya	Literally *carry-ascending.*
	Talapo	Htala	Bur. *len.* Shan *len.*
	Lauwaadie		Lit. *the thunder flaps his wings.*
	Lasa		
	Hta		
	Htoo	Hto	
	Tzes		Chin. *yuen.*
	Tzes		Distinguished in intonation.
	Zezau, or plau	Lau*	Bur. *loo.* Shan *khoung.*
	Kathie	Lateik	
	Nuhteik		Literally *breast-water.*
Moon	La	La	Shan *leu.*
	Meuwoo		
	Am	Meu	Shan *amya.*
	Laseu	Koung	Chin. *khou,* and *hau.*
	Lalau		Simanes *khamta.*
Mouth	Htafeu	Proung	
	Laseu	Takhia	
	Em, or meik	Meing	Bhotia and Chin. *ming.*

* Read Peido, zezau, or Plau.

English	*Sgau*	*Pwo*	*Bghai*
Neck	Ko	Kho	Gau.
New	Thau	Thang	Thay.
Night	Na	Na	Nay.
„ eve	Ha	Gha	Hay.
No	Tameba	May-e,or mway-e	Tamenau, or nau. or tamepato.
Noon	Moohtoo	Muhtang	Moohtiehta.
North	Kalieso	Liekhie	Kalieakhiesau.
„	Mukapa	Moopa	Mookapay.
„	Hsakahsau	Shakahsang	Shaykasha.
Nose	Nade	Na	Naykhede.
Of	A	A	A.
Oil	Tho	Tho	Theu.
Old (of things)	Laulie	Lauglie	Liela.
„ (of persons)	Pgha	Sha	Pghay.
Paper	Sakho	Sakhou	Saykoo.
Plantain	Thakwie	Thakwie	Ya.
„ wild	Ya	Ya	
Poison	Su	Su	
Rain	Tahaysu	Hseuhseung	Waylesu.
Rat	Yu	Yu	Yu.
Raw	Thiekasay	Theinghse	Thietheu.
Red	Ghau	Wau	Liekau.
Rice (paddy)	Boo	Boo	Boo.
„ (cleaned)	Hu	Woo, or ghoo	Hoo.
„ (boiled)	Me	Me	De.
Return	Ke	Htaing	Ge.
Ripe	Me	Meing	Mie.
River	Lo, klo	Lo	Lau.
Run	Sie	Saingtalaing	Sway.
Road	Klay	Pungtha	Klaypootha.
„ coup.	Kapoo	Pungthung	

	Mopgha	*Toungthu*	*Remarks.*
	Khau		
	Tauk		
	Na		
	Ha	Ha	
	Me-e or me-khay	Tamwateu	
	Meuhtook		
	Lalieso		Literally *wind-top.*
	Meupa		„ *sun-side* applied also to south.
			„ *elephant-star* i. e. ursa major.
	Nade		
	A	A	
	Nayteu	Namau	
	Leik		
	Pgha		
	Sokeu		Bur. *sekkoo.*
Plantain	lakwie	Gna	Shan. *kwa.*
	Za		
	Khayhaysu		
	Zu		
	Siateu	Tathiet	
	Wook	Tanya	Shan. *leu.*
Rice	Beu		
	Huk		
	May		
Return	Ga		
	Meik	Hm a	Bur. *hme.*
	Loo		
	Sie	Lau	Chin. *tsou.*
	Peuta	Klaytan	

English	*Sgau*	*Pwo*	*Bghai*
Round	Phleuthaleu	Talookoo	Phleu to hie.
Salt (noun)	Ietha	Htiela	Iethay, or ieta.
„ (verb)	Hau	Ghang	Hay.
Sand	May	Me	Thame.
Sea	Paulay	Panglay	Palay.
Separate	Pha	Pha	Pha.
Shame	Mayhsgha	Memay	Meuthawa.
Ship	Kabau	Kabang	Thaypau.
Short	Phu	Pie	Pheu.
Sick	Hsa	Hsa	Shay.
Side	Kapa	Ghupha	Kapay.
Silent	Bghau	Langmang	Sau.
Silk	Thato	Hto	Thaie.
Silver	Se	Se	Ho.
Sister	Daupuwaymu	Htungphuwemu	Thaypuwaymu.
Sit down	Hsenau	Hsenang	Shana.
Skin	Phie	Phie	Phe.
Sleep	Mie	Mie	Shaumie.
Slow	Kayaukayau	Kyaukyau	Khaykhay.
Small	Hsie	Pe	Shie.
Smell	Neu	Neung	Nu.
Snake	Ghu	Ghoo	Woo.
Soft	Kapooloo	Phook	Kapeutaloo.
Son	Phokhwa	Phokhwa	Pheukheu.
Soul	Tha	Tha	Tha.
Sound	Thau	Thau	Thay.
Sour	Hsei	Hsaing	She.
Spirit	Kala	La	Kalay.
South	Kaliehtie	Liehtie	Kalieakhahtie.
„	Maylaka	Hsanrung	
Speak	Kato, and po	Khlaing	Apo, & hie, & yie.
Say	Sie, and tay	Lau	Dau.
Stand up	Hseuhteu	Hseunhtung	Shauhteu.
Star	Hsa	Sha	Shay.

	Mopgha	*Toungthu*	*Remarks.*
	Htophlau	Tunglung	Bur. *lung.*
	Deikta	Tatha	
	Hau		
	Me		
	Pole		Bur. *penlay.*
	Pa		Chin. *peen.*
	Maykya		
	Thaybo		Bur. *thembau.* Tal. *kabang.*
	Pheu	Pu	
	Hsa		Chin. *Syao.*
	Lapa		
	Sau	Nging	
	Lapfu&lahteu		
	Seu, & theik	Rou	Hindi *sid* Tal. *sraun.*
	Htauphan-waymu		
Sit down	Hsannau	Unglan	
	Pahie	Phro	Chin. *pi.*
	Meik	Ping	
	Khaykhay		
	Hseik	Pa	Chin. *Syao.*
	Neu		
	Ghnk	Hru	
	Bok		
	Feuhwa		
	Ta		Literally the *heart.*
	Lalouk		
Sour	Shie	Hsya	Shan. *htsoi.*
	Lale		Chin. *ling.*
			Literally *foot of the wind.*
			„ constellation of *the cross.*
	Po	Ungdau	
	Tay		Shan. *sat, lat.*
	Sheuhteu	Unghtung	
	Hsa	Hsa	Chin. *sing.*

English	*Sgau*	*Pwo*	*Bghai*
Straight	Lo	Loung	Na.
Strike	Tau	Do	Peu.
Stone	Leu	Long	Leu.
Sugar	Iethahseu	Htielahseung	Iethayshie.
Sun	Mu	Mu	Mu.
Sweet	Hseu	Hseung	Shie.
Swift	Khle	Khliang	Pgha.
Sword	Na	Na	Dashe.
Tell	Sieba	Lauba	Daubay.
Tail	May	Me	Kame.
Take, seize	Hiene	Phoungpie	Piene.
,, coup.	Piekha		Piese.
„ away	Keso	Tainghso	Gesa.
That	Aue	Aynau	Anu.
This	Aie	Ayyo	Ayeu.
Thunder	Lauthau	Lanthay	Lathay.
Tiger	Khe, and botha-o	Khe	Khe,& taypoolie.
Tin	Pgha	Sha	Pabotha.
To	Hsoo	Leu	Seu.
Tobacco	Kathie & nya thoo	Kathie, & yathoo	Kathie.
To-morrow	Khayghau	Kayghai	Kaumoohau.
Tongue	Ple	Phle	Ple.
Tooth	Mai	May	Theumay.
Tree	The	Theing	Theu.
Ugly	Aghaueu	Aghaugeung	Akheu aghaukie-kay.
Understand	Napeu	Nathe	Naykoonu.
Unto	Tu, and hsoo	Htung, leu	Ta, tu, seu.
Wake	Phuthenau	Nangatha	Phuthenay.
Walk	Ha	Gha, & saing	Hay.
Wash	Thesau	Thieyahseing	Suba.
Water	Htie	Htie	Htie, and shu.
„ coup.	No	Noung	

	Mopgha	*Toungthu*	*Remarks.*
	Lo	Son	
	Peu	Tway	Shan. *pautihn* Chin. *ta.*
	Louk	Lung	Lepcha, *long* Limbu, *lung.*
	Deiktahseu		Literally *sweet salt.*
	Meu	Mu	
	Hseu	Neu	
	Hle		
	Lazau		
	Poba	Thouthau	
	May		
Take	Siez	Khon	
„ away	Gaso		Literally *return-carry.*
	Leuba, leune	Tahsu	
	Aie	Yo	
Thunder	Laupau		
	Tapaleik	Ka	Bur. *kya.*
	Pgha	Rek	
	Leu	Eu	
	Lateik		
	Khoumoogho		
	Ple		
	Swahteik	Tagua	Bur. *thwa.*
	Te		
	Akheaghauta-ghe		
	Anam	Thena	
	Tu, leu		Chin. *tai.*
	Phusenau	Ting	
	Ha	Lay	Bur. *lay.*
	Sesay		
	Hteik	Htie	Chins. shui.
	Kha		Siam. *nam.*

English	*Sgau*	*Pwo*	*Bghai.*
Wax	Kho	Kho	Khau.
West	Munu	Munu	Munu.
Which ?	Phaylayghalay	Htounglaghalay	Daulaypghaylay.
What ?	Memunulay	Mayhseunaulay	Memanau And metraymay.
Why ?	Bamanulay	Bahseunaulay	Baymanau, and baytrayna.
Who ?	Matataghalay	Paulaghalay	Pgha nauta pghay nau.
White	Wa	Awa	Botha.
Wife	Ma	Ma	May.
Wind	Kalie	Lie	Kalie.
With	Leu, and dau	Leu, & day	Lay.
Woman	Pomu	Heumu	Peumu.
Word	Takato	Hseukhlaing	Tayapo.
,,	Kalu	Loo	Le.
Yellow	Bau	Bang	Ba.
Yes	Eu, or me	Eu, or may	Eu, or me.
Young	Thasa	Thabang	Thasay.
Year	Nie	Neing	De.
Yam	Nway	Nway	Nway.

Mopgha	*Toungthu*	*Remarks.*
Khoo		
Meune		Lit. *sun-enter.*
Playlay plau-lay	Hsamaynay	
Memanaylay	Hsomaynay	
Baymalay		
Plelaghalay	Pamaynay	Chin. *mut.*
Gwa	Bwa	
Ma		
Lalie		
Lay		
Feumeu		Chin. *myu*
Laluk		
Bo		
Eu, or me		
Tasa		
Nie, and de		
Nway	Nwa	

NUMERALS.

English	*Sgau*	*Pwo*	*Bghai*	*Red Karen*
One	Ta	La	Ta	Ta
Two	Khie	Nie	Kie	Ne
Three	Theu	Thung	Theu, or teu	Theu
Four	Lwie	Lie	Hwie	Lwie
Five	Yay	Yay	Yay	Nya
Six	Khu	Khoo	Theutho	Theutho
Seven	Nwie	Nwe	Theuthota	Theuthota
Eight	Kho	Kho	Lwietho	Lwietho
Nine	Khwie	Khwie	Lwiethota	Lwiethota
Ten	Tahsie	Lahsie	Tashie	Tashe
Eleven	Tahsieta	Lahsiela	Tashieta	Tasheta
Twenty	Khiehsie	Niehsie	Kieshie	Neshe
Hundred	Takaya	Laya	Takayay	Tayay
Thousand	Takahto	Lahtaung	Takahtau	Tarie

Taru	*Mopgha*	*Toungthu*	*Remarks*
Mau	La	Ta	Tal. *mu-a*
Neu	Schheu	Nie	Shan. *htsoung*
Tu	Teu	Thung	Tibet. *sum*
Lwie	Lwie	Leet	Limbu. *lish*
Gnay	Zay	Gnat	Bur. *gna*
Hso	Khu	Thu	
Nway	Um	Nwot	Limbu. *nush*
Hsoo	Kho	That	Lepcha *kakeu*
Kwie	Khwie	Koot	Shan. *kowt*
Hseu	Lashie	Tasie	Chin. *shi*. The first root is *one*.
		Tasieta	
	Schheushie	Niesie	
Aya	Laza	Talyea	
Alie	Lahto		

Remark. In this paper *oo* represents the English sound.

ay „ „
e „ the Continental „
eu „ „ „

The long and short vowels are not distinguished, nor are the intonations which distinguish words in Karen that have the same vowel. For the general comparison of languages, it has not been deemed necessary to distinguish them, and to do so would involve the use of many diacritical marks which would confuse the manuscript.

Coin Collections lost during the rebellion.—*By* George H. Freeling, Esq., B. C. S.

It is in consequence of the great stress laid by all who have written on Indian Numismatics including Wilson, Cunningham and Thomas, on the locality in which the coins of any race or dynasty are found, that I am induced to notice the dispersion of my own collection at Allahabad during the late troubles there.

In many cases, and particularly as regards the later Bactrian or Indo Greek reigns, the principal or only means we have of determining the area over which the sovereigns by whom they were struck held sway are the coins themselves and the places of discovering them, and the fact of many of one series being procured far away from their usual seat may lead into error those who found theories on and argue from such a basis.

The collection in question was, as noticed by Mr. Thomas in his paper on Gupta coins published in the Journal in 1856, chiefly made at Hamirpore in Bundlecund, and was naturally in great measure formed of specimens obtained in the Doab, the appearance of which at Allahabad or in its neighbourhood would excite no surprize, and call for no remark. But it had been enriched by many contributions from the westward, particularly Muttra, and the purchase of a small collection made at Peshawur and another belonging to the late General Palmer had added a large quantity of those usually termed Bactrian, and Indo-Scythic, the latter especially being very numerous and finely preserved, many too with the original rust on them, which of itself might be sufficient to lead a purchaser to believe they had lately been dug up in the vicinity.

There were likewise many of the rarer species of those commonly called the Bull-and-horseman, denominated by Mr. Thomas the "coins of the kings of Cabul," and chiefly procurable in the Punjab, or even further north. Sassanian and Cashmere coins with many others from the same direction were included in the loss.

I would also notice at the same time that a second cabinet has been dispersed during the mutinies, that of Lady Sale; it was in the possession of Mrs. Holmes, who with her husband was murdered by the Irregulars at Segoulie; they then plundered her property, among which were the coins in question. Never having been fortunate enough to see the collection myself, I cannot give any specification of its contents which, however, were, I believe, rather rare and choice than numerous; all, save a few copper pieces, have now disappeared.

A Register of the Temperature of the Surface of the Ocean from the Hooghly to the Thames.—By A. Campbell, Esq., M. D.

To Major H. L. Thuillier,—*Deputy Surveyor General, Calcutta.*

Sir,—On leaving India for England in February 1856 I received through your prompt and kind assistance two Thermometers from Government to enable me to keep a register of the temperatures of the ocean for M. Hermann Schlagintweit, and the Asiatic Society. I kept the register faithfully all through the voyage from the Sandheads of the Hooghly till we entered the Thames, a copy of this register with a chart of the voyage of the *Agamemnon** was forwarded with the annexed letter to Colonel Sykes, the Chairman of the Honorable the Court of Directors, and I have the pleasure to forward a duplicate of it for the information of the Asiatic Society.

* Shewing the daily position of the Ship at Noon.

For the delay in doing so, the Society will, I hope, excuse me. The period that has elapsed since I rejoined my station in the end of May last, has not been favourable to thinking of such matters.

I am, yours very truly,

A. Campbell, M. D.

Darjeeling, January 21*st*, 1858.

To Colonel Sykes, *Chairman, &c., East India House, London.*

Sir,—Previous to my departure from India I was requested by H. Hermann Schlagintweit to keep a register of the temperature of the surface of the ocean on the voyage round the Cape of Good Hope, as such a register was a great desideratum to him in connection with his other Meteorological researches in the East.

2. Having been furnished with Instruments for the purpose by the Government of India, I made the required observations, which are herewith forwarded, and have now to request that you will do me the favor to take charge of them for Mr. Schlagintweit.

I have the honor, &c.,

(Signed) A. Campbell, M. D.

Memoranda on the Register.

1. Register commenced on the day after we left the Pilot, 21st February, 1856.

2. On the 2nd of March at the time of both observations the temperature of the sea was 2° higher than that of the air, viz. 82° and 84°. This being the first time I had observed this result. I

made double observations, i. e. I registered the air and sea from both Thermometers alternately. The result was the same.

3. On the 29th at 3 P. M. the air and sea were 86°. At 6 P. M. a squall came on with heavy rain, which lasted, the rain, for 6 hours. This cooled the *air* from 86° to 82° but the temperature of the Sea fell 2° only in the same time.

4. On the 3rd at 3 P. M. the air was 85° the sea 86°. We had a squall and a shower of a rain at 8 P. M.; on the 4th at 9.30 A. M. the air had fallen to 83° the sea to 84° only.

5. Since we approached the equator i. e. since we passed 5° North, I have observed that the mercury does not fall more than 2 degrees from the evaporation of the moisture on the instrument. North of 12° it used to fall 6 degrees.

6. For the first 7 days the observations were taken on the main deck at the Poop-ladder in the shade, since then they have been taken in a starboard Poop Cabin aft the Cuddy with open port and jilmills; and I think that the situation is preferable from equability of shade to the deck, or any other part of the ship for registering the temperature of the air.

7. In the Indian ocean we found the South East trade blowing in the 8th degree of S. Latitude, and we left it in 27°.

8. To the *West* of the Cape we found the South East trade in 31° and left it in 1° South.

9. Found the North East trade in 6° North and carried it to 25°. Found the sea weed in Latitude 19°, Longitude 39° West and lost it in Latitude 31°.

10. On the 21st of March Latitude 24° 38′ Longitude 54°-42′ the morning was calm, Thermometer in air at 9½ A. M. 80°, sea 79°. At 2 P. M. we had a squall from the South West which reduced the temperature of the air to 76° at 3 P. M., but the temperature of the sea was 80°. It had risen 1 degree before the squall, I presume, and had not diminished by 3 P. M.

11. On the 25th March in Latitude 29° 51′ Longitude 40° 17′ we had the wind from the North, a land wind from the Island of Madagascar. The Thermometer in air at 9½ A. M. stood at 79°; the temperature of the sea was 75½. At 3 P. M. the temperature of the air was 82° (sea 80°) or 7° higher than on the preceding day when the temperature of the air at the same hour with the wind from the South East was 75° only. On the 26th the wind was again from the South, the air fell to 77°, but the sea had not cooled with equal rapidity, and stood at 79°.

A. Campbell.

Register of the Temperature of the Surface of the Ocean kept on Board the Ship "Agamemnon," Captain Hyne, *on her voyage from Calcutta to England in* 1856.—*By* Dr. A. Campbell.

Date. 1856.	Air. 9½ A. M.	Air. 3 P. M.	Sea. 9½ A. M.	Sea. 3 P. M.	Latitude at Noon.	Longitude at Noon.	Wind.	Remarks on the weather, &c. &c.
Feby. 21	76½	80	77	77½	19-44	88-36	N. W.	Light breeze. Run till noon 88 miles.
„ 22	80	82	80	81	18 36	88-33	N.	Calm and hot. Run 50 miles.
„ 23	79½	81	79	80	17-16	88-20	N. E.	Fine breeze. Run 70 miles.
„ 24	79	82	79½	81	15-17	87-56	N. E.	Ditto ditto. Run 122 ditto.
„ 25	82	84	81	82	13-33	87-31	N. E.	Light breeze. 106 ditto.
„ 26	82	84	81	82	11- 2	87°	N. E.	Fine breeze. Run 151 miles.
„ 27	83	84	83	83	8-31	86-59	E. N. E.	Ditto ditto. Cloudy and damp. 150 miles.
„ 28	84	84	83	84	6-17	86-10	E. S. E.	Calm and damp till noon. 146 miles.
„ 29	85	85	84	85	3-10	84-52	E.	Fine breeze. A few drops of rain. 205 miles.
March 1	85	86	84½	86	N. 50	83-44	E. S. E.	Light breeze. Lightning, squalls, a little rain last night, 154 miles.
„ 2	82	82	84	84	S. 37	83-16	W.	Calms and light breezes. 93 miles.
„ 3	83	85	84	86	1-50	83-13	W.	Ditto till 8 P. M. when we had a squall and an 8-knot breeze. 75 miles.
„ 4	83	85	84	85	3-17	83°	N. W.	Light breezes all day. 86 miles.
„ 5	83	86	85	87	4-21	82-49	N. W.	Light breezes 65. Ditto.
„ 6	83	84	84½	86	5-10	83-10	W.	Very light Ditto, squall last night, 79 miles.
„ 7	83½	86	85	85	6-21	84-47	N. W.	Calm, 90 miles.
„ 8	84	87	85½	87	7- 8	85-23	N. W.	Ditto, 59 miles.
„ 9	84	87	85	87	7-34	85-40	W.	Calm, close and disagreeable, 31 miles.
„ 10	86	85	85½	86	8-15	84-29	S. E	A heavy shower at 10 A. M. S. E. trade wind commenced.
„ 11	83	84	84	84	10-12	82- 3	S. E.	Fine 9-knot breeze. Trade wind steady, 182 miles.
„ 12	83	84	83	83½	12- 2	78- 7	S. E.	Ditto ditto ditto. Run 274 miles, air damp.
„ 13	83	83	83	83	14-24	74-15	S. E.	Ditto ditto. Run 250 miles.
„ 14	83	83	83	82	16-54	71- 2	S. E.	Ditto ditto, 238 miles, cloudy and showery.
„ 15	82	83	81	82½	18-24	68-19	S. by E.	Run 182 miles, damp and showery.
„ 16	81	82	81	82	19-11	66-33	S.	Ditto, 110 miles.

„	17	80	80	81	82	19-54	63-42	S.	Off the Island of Rodrigues, 168 miles, light breeze and very pleasant weather.
„	18	80	80	81	81	20-52	61-40	S.	Light breeze, 129 miles.
„	19	80	81	81½	82	21-55	59-15	S.	Ditto cloudy, 150 miles.
„	20	80	81	81	81½	23-24	57- 7	S.	Ditto ditto, run 150 miles.
„	21	80	76	79	80	24-38	54-42	S. W.	A squall at noon after a calm morning. See Memoranda, 154.
„	22	80	81	81	81	25-42	52- 6	S. W.	Calm, 156 miles.
„	23	80	80	80	79	26-51	50-13	S.	Easter Sunday. Light breeze 124 miles.
„	24	80	75	79	76	28-30	47-36	S. E.	Fresh breeze. Squall, rain, thunder and lightning, 171 miles.
„	25	79	82	75½	80	29-51	45-10	North.	Ditto ditto. See Memoranda, No. 11, 152 miles.
„	26	77	77	77	79	30-26	44-20	S. W.	56 miles.
„	27	75	78	78	80	30-45	42- 9	....	A calm, 114 miles.
„	28	75	75	77	79	30-27	40-17	S. S. W.	Strong breeze, 99.
„	29	74	77	75	77	31- 3	38- 1	S.	Light breeze. 123.
„	30	75	77	73½	77	31-41	35-55	N. E	Ditto ditto, 116.
„	31	76	74	76	73	33-23	32-12	N. W. & S. W.	Fresh breeze. Run 216 miles.
April	1	77	79	77	78	34-11	27-54	N. E.	Strong breeze. Off Cape Reciffe. 220 miles.
„	2	73	75	73	72	35-34	23-42	E. and N. W.	Run 222 miles. On Lágullas bank. Colour of the sea changed to green, supposed soundings 90 fathoms. The sea full of animalculæ and emitting a fishy odour. Magnetic var. 30 degrees or 2 and 3-4th points of the compass.
„	3	72	73	70	70	35-42	20-44	S. E. Off the Cape of Good Hope.	
„	4	70	70	72	70	35- 9	18-13	S. 295 miles.	
„	5	67	67	68	67	32-20	15-35	S. Entered S E. trade 173.	
„	6	67	68	67	68	30-19	13-17	S. E. 253 miles	
„	7	68	68	68	68	28-20	9- 3	S. E	

Date. 1856.	Air. 9½ A. M.	Air. 3 P. M	Sea. 9½ A. M.	Sea. 3 P. M	Latitude at Noon.	Longitude at Noon.	Wind.	Remarks on the weather, &c. &c.
April 8	69	70	68	78	26-40	6-17	S. E.	Run 179 miles.
„ 9	70	71	70	71	25-35	5- 8	S. E.	Very light breeze, 89 miles.
„ 10	70	71	70	71	24-14	3-20	S. E.	Ditto ditto 129.
„ 11	72	74	72	72½	22-51	1-36	S. E.	127 miles.
„ 12	73	73	72	73	21-38	0-28	S. E.	Cloudy, 97 miles.
„ 13	73	71	73	73	20-37	1- 0	E.	Run 104 miles.
„ 14	75	74	74	74	19-21	2-36	S. E.	117 miles.
„ 15	77	75	75	75	17-17	4-21	S. E.	Cloudy 160 miles.
„ 16	75	75	75	75	15-56	5-44	S. E.	Off St. Helena. Cloudy and showery.
„ 17	75	75	75	75	....	....	S. E.	Ditto ditto ditto, grapes, peaches, pears, figs, apples, plantains in season.
„ 18	77	77	77	77	14-12	7-13	S. E.	Fine breeze. Left St. Helena at 3 P. M. yesterday. Run 158 miles.
„ 19	77½	78	77½	78	11-58	9-48	S. E.	Run 183 miles.
„ 20	79	79	79	79	9-32	11-44	S. E.	Cloudy 187 miles.
„ 21	81½	80	81	80	7-32	13-53	S. E.	Clear. Off the Island of Ascension 177 miles.
„ 22	82	83	82	82	5- 7	16-15	S. E.	Fresh trade. 200 miles.
„ 23	82	82	81	81	2-54	19- 0	S. E.	Squally weather with showers 212.
„ 24	79	81	80	81	42 S.	20-18	E.	Unsteady trade. Rainy, run 155 miles.
„ 25	83	81	83	83	1-48 N.	21-12	E.	Trade gone. Squalls and rain by which the air fell to 81° at 3 P. M. but the water had not time to cool to the same extent. Run 159 miles.
„ 26	81	80	82	82	2- 8	22-32	Calm.	
„ 27	83	83	83	84	3- 8	23-36	S. W.	Run 87 miles. Calms and squally.
„ 28	80	82	82	82	4-12	23-58	S. E.	Squalls and rain during the night. 68 miles.
„ 29	81	79	81	79	5-27	25 23	N. E.	Rain. Run 114 miles. Entered N. E. trade.
„ 30	80	80	79	80	6-35	27-59	N. E.	Fresh breeze, 172 miles.
May 1	80	79	78	78	8-50	31-12	N. E.	Fresh trade. Clear. 235 miles.
„ 2	77	78	77	77	11-21	34-16	N. E.	Steady ditto 237 miles.
„ 3	78	77	75	76	14- 4	36-50	N. E.	Ditto ditto 232 miles.
„ 4	78	77	76	76	17-36	39-22	N. E.	Fresh trade. 258 miles. Sun vertical in 16°.

,, 5	77	77	76	76	21-24	40-24	N. E.	Ditto ditto. Sea weed abundant. 236 miles.
,, 6	76	75	75	75	24- 1	41- 0	N. E.	Slack trade. 160 miles.
,, 7	75	75	74	74	26-22	40-20	S. E.	Light breeze. 146 miles. Sea weed abundant.
,, 8	74	74	73	73	28-50	38-20	S.	Rain. 199 miles.
,, 9	73	73	72	72	30-25	36-57	S. E.	Light breeze. Less sea weed. 120 miles.
,, 10	73	72½	71	70	31-41	36-45	S. E.	Ditto ditto.
,, 11	71	71	68	68	33- 1	36- 1	S.	Ditto ditto. Sea weed gone. 87 miles.
,, 12	66	66	65	65	34-27	37-22	N. E.	Very fresh breeze. 114 miles.
,, 13	63½	64	63	64	36-38	38-42	E.	Ditto. 113 ditto.
,, 14	63	63	62	63	38-45	39-21	E.	Moderating. 130 ditto.
,, 15	63	66	62	62	39-28	37-45	S. W.	The change of wind raised the temperature of the air to 66° between the 1st and 2nd observation, but had not time to affect the water. 87 miles.
,, 16	63	63	62	64	40- 7	35-36	S. W.	Light breeze. 107 miles.
,, 17	61	62	59	60	41-40	31-48	S. W.	Fresh breeze 199 miles.
,, 18	61	62	59	59	43-1	27-33	S.	Ditto ditto 207 ditto.
,, 19	59½	59	57	57	44-29	22-58	S. W.	Ditto ditto 217 ditto.
,, 20	58	58	56	55	45-52	18- 3	W.	Ditto ditto 225 ditto.
,, 21	57	58	55	55	47- 6	12-23	S. W.	Ditto ditto 226 ditto.
,, 22	56	56	54	54	48-26	7-46	S.	Ditto ditto 222 ditto.
,, 23	55	53	53	51	50- 0	....	S. E.	Off the Isle of Wight. Run 270 miles.
,, 24	56	57	52	53	....	....	....	Off the Isle of Sheppey at noon and anchored at Gravesend at 7 P. M..

May 24th, 1856.

Description of a new species of Himalayan Mole, Talpa Macrura.—By B. H. Hodgson, Esq.

In preparing a set of skins and sculls for despatch to Europe I find a marked species of Mole which has not been I think described, and which differs from the ordinary Himalayan one by being a third smaller yet having a tail five times as long. The following is its summary description.

Tip of snout to base of tail, 4 inches. Head $1\frac{1}{8}$ inches. Tail and hair, $1\frac{1}{4}$ inches, tail only, $1\frac{1}{16}$ inches, palma and nails, $\frac{3}{4}$ inch, planta and nails, $\frac{3}{4}$ inch.

Its colour is deep slaty blue, with canescent gloss, iridescent when wet.

The tail is cylindric and pretty well covered with soft hair which extends a little beyond its tip. As I called the other Micrura, so I name this one Macrura.

Moles are very abundant in the Himalaya, the deep bed of black vegetable mould, every where prevailing (so long as its protecting cover of forest and brush-wood is not cleared off), affording a plentiful supply of those earth-worms which constitute the Mole's chief food.

The abundance of Moles therefore gives a distinct clue to the surface character of this gigantic system of mountains, or rather to the Indian slope of it, and most especially to the central or normal region.

Lith. By R. M. Smith Surv. Genl. Office Calcutta Feby. 1853.

A Twenty-Fifth Memoir on the Law of Storms in India, being the H. Company's Steamer Pluto's Cyclone in the Gulf of Martaban 23rd and 24th April, 1854.—*By* Henry Piddington, *President of Marine Courts.*

This Cyclone is on many accounts a very remarkable one and a great addition to our knowledge of that yet uncertain part of our science, the tracks of Cyclones in narrow confined seas; and the vicinity of an active volcano to one part of what appears to have been its singularly curved track, and its intense violence and limited extent make it one of great scientific as well as of mere utilitarian interest. I give first the abridged documents relating to it beginning from the South as usual, and then a table of them and a detail of the conclusions upon which the track is laid down.

Abridged Log of the Ship Aratoon Apcar, *Capt.* Conniew, *from Singapore bound to Calcutta. Reduced to Civil Time.*

The *Aratoon Apcar* was at Noon on the 28th April, 1854, in Lat. 7° 23′ N.; Long. 97° 44′ East with the island of Pulo Rájah bearing E. N. E. 35 miles. Daylight gloomy with lightning. Noon fine and light airs Northerly. P. M. to midnight standing to the N. W. b. N. with light variable airs to 8 P. M. when steady S. W. breeze. At sunset a *heavy swell from the Southward.** Midnight fresh breeze S. West, passing clouds and heavy puffs.

By Noon 22nd April.—The ship had run up to Lat. 10° 53′ N.; Long. 95° 59′ East with winds of variable force from calms to stormy breezes and squalls, variable and Southerly throughout. Her Barometer had risen from 29.90 at 11 P. M. on the 21st, to 30.00 at Noon of the 22nd. The sea is marked throughout as "a high cross sea," "a terrific sea," and "a most turbulent sea keeping the decks awash," and at 8 P. M. on the 21st, though a calm, it is marked as "a turbulent sea breaking in all directions," and a protest is entered in the log of the 22nd and 23rd on account of it. By midnight 22nd and 23rd Barometer had fallen to 29.70. Gale "very fresh" and a high sea spoon drift and sea passing like a sheet of

* I note in italics this singular swell as it occurs on successive days, and shall refer to it in the Summary.

water over the vessel. During these two days ship running up to the N. W. b. W. and N. W. ½ N. from 2 to 8 knots. The wind is marked at 1 P. M. on the 23rd as "Southerly."

On the 23rd April.—4 A. M. cruel weather. 7 A. M. wind marked S. W. sea making a clean breach over the vessel and described as awful; the ship was now under storm sail. Barometer at 29.60 at 6 A. M.; Noon no position given; Lat. by Acct. 12° 47′ N.; Long. 94° 29′ East; P. M. wind becoming more Westerly, and by 8 P. M. moderating to light breezes; at 10, wind S. W. a 2-knot breeze only, and at 11 the Barometer is marked at 29.80. At Noon 24th, Lat. 14° 6′ North; Long. Chr. 94° 33′ East.

Abridged Log of the H. C. Steamer PLUTO, *Capt.* S. G. BOON, *Commander, from Moulmein to Rangoon. Civil Time.*

The *Pluto* left Moulmein on the 21st April, 1854, having on board a detachment of European Artillery with officers and followers, in all one hundred and fifty-five persons with their baggage designed for the relief of the garrison of Bassein. The weather is described as thick and gloomy, increasing at midnight with light rain at times and a cross swell from the S. Eastward. Wind varying from S. East to West. The Barometer at Noon was at 30.00; Aneroid 29.77; Sympiesometer 30.00. At midnight Bar. 30.00; Aneroid 29.78; Sympiesometer 30.35; Ther. 81°. This kind of weather it is remarked in Capt. Boon's report is usual at this period of the year.

22nd April.—A. M. a long Southerly swell; at 4, fresh breezes S. E. and threatening weather; Bar. at 5. A. M. 29.87; Aneroid 29.40; Symp. 30.25; Ther. 81°. Daylight, weather as before, vessel labouring much, steering to the S. W. ½ S. with a heavy Southerly swell. At 8, more moderate. At Noon, moderate but gloomy; Bar. 30.1; Symp. 30.10; Ther. 81°. Lat. Obs. 15° 30′ N.; Long. 96° 9′* East. P. M. light breezes Southerly and cloudy with a S. Westerly swell. 3 P. M. saw Point *Baragua* from the mast head bearing W. N. W.† distant about twenty miles. Soundings at 2

* 95″ 9′ in the log which would have placed the vessel to the Westward of the points.

† W. S. W. in the log and official reports but W. N. W. is no doubt meant

P. M. 14 fs. and at 4 P. M. 11 fs. At 4 P. M. Bar. 30.00; Symp. 30.10; Ther. 84½°. A strong Northerly current; at 4 P. M. wind marked S. East, swell increasing from the S. West. Sunset gloomy and threatening, made all possible preparations for bad weather, vessel steering out to the S. S. W. At 8, increasing breezes from S. East, dark gloomy weather with passing showers and lightning; Bar. 29.90; Symp. 30.00; 9 P. M. Bar. 29.80; Ther. 84°; Symp. 29.90; wind marked S. East at 9 P. M. Every appearance of a gale in the Gulf to the S. West of the vessel; altered course to S. East with a view of clearing its track; sea increasing to midnight, when blowing a gale from S. East with passing light rain *and sheet lightning*, Bar. 29.60; Ther. 83°; Symp. 29.70; Aneroid 29.60.

23*rd April.*—A. M. heavy S. East gale, Artillerymen pumping, as the Engine could not keep the bilge-pumps going fast enough; 4 A. M. Bar. 29.40; Ther. 84½°; Symp. 29.60. Sea increased and now mountainous and confused, horizon at times no where visible from the height of the waves; 5 A. M., ship unmanageable and in danger of foundering; threw all the deck baggage overboard; 6.30 A. M. ship more buoyant.

At 7 A. M. a lull of 15 minutes; securing masts, funnel, &c. for a shift of wind, Bar. 29.09; Ther. 84°; Symp. 29.20; Aneroid 29.10. *Observed the Bar. rise and fall* 1 *inch.** Much sheet lightning; saw sea birds about the ship and noticed *the water effervescing alongside.*† At 7h. 15′ wind shifted to the N. W., blowing with indescribable force; boats, bulwark and paddle-box blown away. Lashed the helm a lee as the men could not stand the violence of the wind and spray. All hands lying flat on the deck holding on to the bolts, &c. under the lee of the weather bulwarks; impossible to move along the deck without crawling on all fours. *Bar. oscillating very much* and finally settling at 28.40. Obliged to desert the pumps from the fearful violence of the wind. Ship buried in the sea. Foremast invisible from the funnel from the sheets of spray.

as W. S. W. would place the vessel in 4 fathoms water to the North of the Krishna shoal. I subsequently learned that these were clerical errors.

* From 29.09 to 30.09 and falling again instantly as specially noted in Capt. Boon's official report.

† The italics are mine throughout this log.

All who were exposed felt it exceedingly cold during the height of the hurricane and experienced a most painful sensation about the face particularly in the eyes. Could not throw the guns overboard; sea one mass of foam and spray; 11, Bar. rising, wind abating and shifting to the westward, 2 feet 9 in. of water in the hold when we could sound the well. Noon Bar. 29.9;* Ther. 84°; Symp. 29.40. Weather moderating fast; P. M. wind and sea moderating; Bar. 29.40; Symp. 30.00; Ther. 83°. Finding that the vessel was much damaged and leaky and that it was useless to take on the troops without their baggage and accoutrements put back to Moulmein, and by midnight the weather was perfectly fine.

At Noon on the 24th.—Lat. 15° 12′ N.; Long. 96° 52′ East shewing a set of sixty miles to the South during the hurricane. In his official report, Capt. Boon states that he considers the centre to have passed up between the Rangoon and Sitang Rivers.

I forwarded a set of queries to Capt. Boon regarding this Cyclone, to which he and his Chief and second officers have been good enough to give me the replies noted below.

Queries forwarded to Capt. BOON *with his replies and those of his Chief Officer Mr.* HARTON *and Second Officer Mr.* GALES.

THE SKY CLOUDS, &C.

QUERY No. 1.—*What was the appearance of the sky during the Cyclone and specially during the lull. Was there any clear space in the zenith?*

CAPT. BOON.—The sky was dark and lowering with very little scud, I particularly observed that there was no clear space in the zenith during the lull, but there was an apparent break in the weather, so much so, that those on board who were unacquainted with the law of storms, prognosticated fair weather, and were much surprised when I informed them that the *Pluto* was in the centre of the Cyclone; it was certainly deceiving, but as I am a thorough believer in the law of storms I made preparations for a shift of wind and bad weather.

CHIEF OFFICER.—The sky during the Cyclone was overcast with dense clouds. The night was particularly dark, no stars visible. No clear space in the zenith.

* So in the MSS. probably 29.09 is meant.

Second Officer.—Gloomy with dark overhanging clouds, there was no clear space in the zenith.

No. 2.—*Was there any remarkable light or darkness? Was the sea luminous. If any light whence was it derived?*

Capt. Boon.—There was no remarkable light and the sea was not particularly luminous. The night, previous to the lull, was very dark, I may say the darkest night I ever experienced.

Chief Officer.—The night was particularly dark. Daylight was a long time breaking. No remarkable light; sea not more luminous than usual when breaking.

Second Officer.—No particular light or darkness farther than I have generally seen in bad weather. No luminous light observed.

No. 3.—*Was there any remarkable lightning during the lull. Describe all the kinds of lightning carefully.*

Capt. Boon.—Flashes of distant sheet lightning at intervals, but no thunder; the lightning was very faint and had the appearance of being a long way off; it came from all quarters of the compass.

Chief Officer.—During the lull very faint long flashes of lightning (reflected light?) No thunder heard.

Second Officer.—Faint flashes at intervals.

The Sea.

No. 4.—*When was the effervescence spoken of in the log first noticed?*

Capt. Boon.—During the lull, and lasted until the wind came from the N. W.; the sea was very confused, rising very high and falling apparently with no progressive motion; the *Pluto* laboured less in the centre than she did in any other part of the Cyclone.

Chief and Second Officers.—During the lull.

No. 5.—*How long did it last?*

Capt. Boon.—About a quarter of an hour.

Chief Officer.—Noticed during the lull.

Second Officer.—About half an hour.

No. 6.—*What was it like? Did it amount to frothing?*

Capt. Boon.—It was like boiling water; it amounted to frothing; it had a white appearance but gave no sensible light.

Chief Officer.—The rising and falling of water in a boiling

cauldron. Bubbles rising to the surface as seen in a pond when stones reach the bottom.

Second Officer.—At the meeting of two confused tides.

No. 7.—*Did it give out any light?*

Capt. Boon.—No sensible light; perhaps if it had occurred at night, light would have been observed.

Chief Officer.—No light.

Second Officer.—Did not observe any.

No. 8.—*Was there any smell or other sensation from it?*

Capt. Boon.—No smell or other sensation, excepting we all felt it very cold.

Chief and Second Officers.—No.

No. 9.—*Any noise of a peculiar kind such as a hissing or rumbling?*

Capt. Boon.—No noise accompanied it, there was no hissing.

Chief and Second Officers.—None.

No. 10.—*Did the water feel warm or cold? Was it remarkably luminous?*

Capt. Boon.—I felt very cold and was of course wet through, and my opinion is, that it was the sea water that made us feel cold and not the wind, for it was only when the sea began to make a breach over us that we felt it cold.

Chief Officer.—Did not try it. Had it (the lull) been during the night we might have seen it luminous.

Second Officer.—Felt very cold. Did not observe it luminous.

Personal Sensations.

No. 11.—*Describe as particularly as you can the sensation about the face spoken of?*

Capt. Boon.—The sensation about the face was similar to that experienced in a severe hail storm, when walking against the wind, the eyes were inflamed by the spray, which was very dense, so much so, that at intervals I could see no one. I afterwards felt as if I had been stung by nettles over the face and hands.

Chief Officer.—Stand facing a hail storm of severity and you have a good description.

Second Officer.—Sharp and cutting, such as experienced with cold bleak winds in high latitudes.

No. 12.—*Also the cold mentioned? Its temperature if noticed?*

Capt. Boon.—The cold was very severe, as cold as I have felt it in England, the temperature was not noted on deck, those who were battened down below, felt it very hot: the Ther. stood at 80° in the cabin, the Doctor registered the Bar. &c. &c. during the height of the Cyclone.

Chief Officer.—The cold was severe and made my teeth chatter. Thermometer not on deck.

Second Officer.—No.

No. 13.—*Was there any feeling of oppression or exhaustion or other sensations differing from what mere fatigue would have produced, as for instance that of excitement?*

Capt. Boon and Chief Officer.—No.

Second Officer.—Cold very intense.

No. 14.—*Were any persons on board affected after the Cyclone had ceased, more or differently, from what fatigue alone would account for?*

Capt. Boon.—No one was particularly affected to my knowledge, sores broke out about the legs and feet of the 1st and 2nd officers and 1st Engineer. I was much exhausted, and considerably reduced, but that I attribute to exposure as I was on deck full forty-eight consecutive hours without sleep or food, and of course very anxious; I also felt much excited for some two or three days after I arrived in port.

Chief Officer.—The soles of my feet cracked and smarted with the salt water, felt the eyes very sore from the salt spray.

Second Officer.—A few persons complained of sores on the feet and legs, also painful sensations over the face and eyes, and mostly all of fatigue.

No. 15.—*Add any other notes, force of the wind, &c.*

Capt. Boon and Chief Officer.—Force of the wind was 12.

Second Officer.—Indescribable.

No. 16.—*When the shift of wind to the N. W. came on, were there any screaming or roaring noises with it?*

Capt. Boon.—When the N. W. wind came on, it was accompanied by a fearful roaring noise, the heaviest thunder could not have been heard. I can only compare the wind to a metallic substance pressing against the vessel; in fact I thought at one time

the sides of the *Pluto* would be blown in, she heeled right over her broadside and remained in that position for four long hours, the roaring of the wind was similar to a powerful steamer blowing off steam. If I had not been prepared for the shift to the N. W., funnel and masts must have gone; I think if we had not had wire rigging, the masts must have gone and perhaps the vessel.

The Barometer stood high when we left Moulmein river, but the weather looked dirty, but not more so than you would expect in the S. W. monsoon, even when I sighted the land about Barazie there was nothing extraordinary in the weather.

They had the wind at Moulmein, first at S. E. and then S. W. it was hardest there at S. W. I found that the trees blown down there fell to the N. E. I forgot to mention that the Master Attendant of Moulmein on the very day of the hurricane went out to sea in the *Trusty* Schooner; so little did he expect a hurricane! If I had gone to the E. N. E. when I discovered the track of the storm was N. E. how should I have had the wind? Would it not have veered to the South and S. W. and West? I should not have been *far* from the centre, and, if the wind veered to the Westward, I should have had a dead lee shore, shoal water, and an unmanageable ship; I think the wind would have more power over the hull of the *Pluto* than the current, as I have often noticed as well as others who are accustomed to the small iron vessels, that when lying in a tide-way they will remain wind-rode, while other and larger vessels are riding with the tide. There was only one way I fancy of avoiding the hurricane, and that was jammed up by the land.

Chief Officer.—Saw it coming from the N. W. and heard it blow with indescribable violence.

Second Officer.—Heard it approaching with great noise, but no screaming.

Abridged Log of the H. C. Light Vessel Tavoy, *Mr.* S. W. Hazlewood, *Commanding Officer. Off Elephant Point.*

21*st April.*—At 10 A. M. severe squall from the S. East, during the day fresh breezes E. S. E. to S. East with heavy rain as noted. At 6 P. M. weather "looks threatening" and at 10 P. M. "a nasty sea is getting up."

22*nd April.*—Wind marked E. S. E. till 2 P. M. when N. East. Strong breezes and hazy weather with severe squalls occasionally. At 10 P. M. weather is noted as "clearing up for an hour, but soon looked as black as before." Preparing for bad weather.

23*rd April.*—About 7h. 30m. A. M. commenced blowing very hard from the E. S. Eastward and very shortly blew a perfect hurricane till about 1h. 30m. P. M. when the wind veered rapidly to N. N. W. and blew harder than before. It was not more than five minutes in veering or shifting from E. S. E. to N. East, North and N. N. W. The sea became frightful, tumbling and tossing about in a most dangerous and remarkable manner. *Tavoy* made very bad weather, lost boats, &c. and crew utterly paralysed through fear. At 4, wind West and moderating. At midnight fine.

Memorandum.—No barometrical observations are unfortunately given with this log.

Abridged Report from Capt. H. LEWIS, *Master Attendant, Rangoon.*

SIR,—I have the honor to report to you the occurrence of a severe Cyclone on this coast; and am only sorry that I am unable to give you a clear or minute detail of the changes of wind or Barometer, as my presence was required nearly the whole time on the river and its banks. I have examined the Log Books of the several vessels that were within its influence, but from only two of them (the *Hannah Kerr* and *Laidmans)* have I been able to obtain any information on the subject, and this but very slight; no barometrical notices have been made by the *Hannah Kerr.*

At Rangoon, on Friday and Saturday the 21*st and* 22*nd of April.*—We had threatening weather, cloudy with slight rain and occasional strong gusts of wind from the Eastward. Barometer fell $\frac{2}{10}$ *and Sympiesometer during the afternoon of Saturday oscillated considerably,** the tide was much higher than usual for the age of the moon.

Sunday, 23*rd.*—Commenced with heavy rain, wind blowing in gusts from East to S. E. Barometer falling rapidly; about 11 A. M. wind N. E.; 1 P. M. North; about 2 P. M. *shifted* with great violence to N. W. Barometer at this time 29.42 and Sympiesometer 29.47,

* The italics are mine. H. P.

the river rose 6 feet, and had it been at the height of the springs the whole of Rangoon would have been flooded.

The *Hannah Kerr* from Glasgow with 700 tons of coal, in Lat. N. 15° 10′ Long. E. 94° 42′ at 8 P. M. had a strong gale from the East.

Sunday.—4 A. M. a severe hurricane from S. E. veered round to N. W.; close-reefed topsail blown away; very high sea running. Noon moderating.

The *Laidmans* from Rangoon, homeward bound, had to cut away main and mizen masts to save the vessel. Enclosed is a printed extract from her Log book.

This vessel saw the spars and deck planks of a vessel, supposed to be about 500 tons; yards, masts and studding sail boom-ends painted white.

The *Shawool Hammed* from the Nicobars was totally dismasted about twenty miles to the Southward of Ballagore Point.

Several other vessels have arrived since, more or less damaged, but I fear we have not yet heard the worst. Several native kuttoos and junks were wrecked close to the mouth of the river, and one schooner, the *Wave*, went down at her anchors in the river.

The heaviest of the hurricane was felt to the Eastward of this between Rangoon and Moulmein, and as yet we have no news from that quarter.

Extracts of the LAIDMANS' *Log.*

"*Saturday, April 22nd, Nautical Time.*—P. M. commencing with light variable airs, 5 P. M. set main top gallant sail, 6 P. M. single reefed the topsails, middle part hard squalls and heavy rain attended with thunder and vivid lightning and a heavy swell from the Southwestward. Ship labouring heavily and making more water than usual, 10 A. M. Wore ship to the S. Eastward, set the spanker and main spencer."

Here it is evident that they had the first token of the gale, and the following day, as appears by the Log Book, was the one on which the accident occurred and which compelled her to bear up and return to this port.

"*Sunday, April 23rd.*—P. M. commencing with strong winds and squally, veering from East to South with a heavy sea from the South-

ward. Ship leaking very much. Pumps closely attended to. Barometer 29.60 2 P. M. Wind increasing, in jib and mainsail and 2nd reef of the topsails. Barometer 29.50. At 4 P. M. wind S. E. wore ship to the S. Westward. Wind and sea increasing. Ship leaking much more. Pumps closely attended to. Observed the water coloured. Barometer 23.50; and at 6. P. M. 29.20. The gale and sea increasing. In all, but the close-reefed topsails and foretopmast staysail. Heavy seas breaking on board and could not stand properly to the pumps. Midnight, strong gales, and terrific squalls with a heavy sea running, ship labouring and straining very much, carried on the close-reefed topsails to get the Prepris channel open. Barometer 29.10. At 4 A. M. it blew with fury—the foretopmast staysail blew away; split the foretopsail and main spencer; ship lying over very much, with a dead body of water on deck. Found we could not keep the pumps clear; water gaining on us very fast. Barometer 29.00. At 6.30 A. M. it blew a hurricane, ship laying down on her beam ends. All hands perfectly stupified and could not hear me speak to perform my orders, and it was impossible for them to stand at the pumps. The dead water was lying on deck over the hatches. The Master went below to see the Barometer, when he heard the water running in at the stern and all the cabins afloat. The carpenter was called for, and knocked all the panellings away. He then stopped a very great leak on the starboard quarter; my attention was next drawn on deck, the ship was laying over so that I had great trouble in getting up the cabin stairs and when I did get on deck, I found the wind had vecred to the Westward. Barometer 28.90. Lost the foresail in trying to wear ship. Got a studding sail into the forerigging, but found it of no use. It then came on to blow more awfully than before, the ship laying on her beam-ends, and we saw plainly the ship settling down fast. The main and mizen mast were cut away and the ship righted at once and then hauled to the S. S. E. Sounded the pumps and found five feet water in the hold. Set all hands to the pumps."—*Rangoon Chronicle, April 29th.*

Extracts from the Rangoon Newspapers.

RANGOON.

Rangoon was on Sunday last visited by a hurricane, or as the

scientific world will now have it, a Cyclone, of a most violent description.

On Sunday evening the near approach of bad weather was pretty clearly foretold, by the rapid fall of the Barometer. From this time the wind, which was from the S. E., began to increase, accompanied with heavy rain. The storm reached its maximum violence at about 2.30 P. M. on Sunday, when the Barometer fell to 29.42 and Sympiesometer to 29.48, but from daylight in the morning had continued to blow in alarming and destructive gusts, and had veered completely round from its original point, to the North and Westward. Much serious damage has been done in the town attended, we regret to say, with loss of life.

We have only however authentic information of the death of one old man (a milkman) upon whom a beam of his house fell. Many of the pucka buildings which the owners have been so anxious to get completed before the rains, and upon which large sums have been expended—the expenditure being more than doubled by the enhanced price of labour and materials—have fallen down, or are otherwise materially injured, owing chiefly to their not having had time to set, before exposure, first to such a deluge of rain which loosened their foundations, and then to gusts of wind acting on their walls. It has been a severe test for such brick buildings as have escaped.

On the river also much damage has been the consequence. The schooner *Wave* foundered, with loss of three lives, the *Flora* nearly sharing the same fate. All the ships drifted more or less; and hundreds of boats were swamped and lost. The Engineers' Department and Timber Merchants have suffered severely by the breaking up and dispersion of their rafts: as also we believe the Dockyard.

We cannot learn from the oldest inhabitants, that Rangoon has witnessed such a storm before. We trust that its violence did not extend to the gulf of Martaban, or we may anticipate bad news from the shipping outside; and the *Tenasserim* will have had a severe taste of it.—*Rangoon Chronicle, April 26th.*

A Rangoon paper of the 3rd of May contains a further report of the mischief done by the late Cyclone, which we have extracted.

"The *Zenobia* is off in a few hours, so just a line by her. The

Fire Queen is two days behind her time from Maulmain. She has most likely been detained to look for wrecked ships and boats at the mouth of the Sitang river. It is feared that a terrible disaster has happened in the Sitang river. A fleet of thirty-five boats left Maulmain on the 19th ultimo, having on board the Head Quarters 36th M. N. I., and a third of a Company of European Artillery, for Sitang and Shewgeen. They were caught, it seems, in the terrific gale of the 23rd, when about thirty miles below Sitang, one boat's company have reached Pegu, and reported that the bore came mountains high, and caused the whole of the rest of the fleet to disappear. Whether all have swamped, or whether they were driven down the river and out to sea by the gale, which blew from the North, is at present unknown. Elephants with provisions have been sent from Pegu to look for people along the bank of the river. The very worst fears are entertained, but as natives often greatly exaggerate, it is quite possible some of the boats may have been driven ashore on the bank of the Sitang river. The *Fire Queen* must bring in the news to-day.

"*P. M., 3rd May.*—Since writing a few hours ago, the *Fire Queen* from Maulmain has come in, bringing a few particulars of the accident on the Sitang river. Lieut.-Colonel Johnstone, who was proceeding to join his Regiment at Tounghoo, being in a good boat, weathered the bore and the wind, and got safe into Sitang, where, however, he was robbed of all he possessed by the Burmese. He saw, it is said, ten boats with men in them go down, what has become of the other twenty-five boats is not known.

A private letter from Captain G. C. Haughton, *Magistrate at Maulmein gives the following account of the weather at that station.*

On Sunday morning, 23rd.—We had wet windy weather and cloudy; wind *I think* N. East; by Noon it was very high at East. By 2 P. M. it was S. East and gradually shifted to S. W.; much rain from Noon. By 4 P. M. it was blowing a hurricane at S. W. and continued to about 7.30, gradually veering Westerly. After 8 P M. it was high at W. N. W. and the wind gradually veered and fell till daylight when we had a moderate breeze at S. East. The oldest trees were rooted up, but all things considered, wonderfully little damage was done to the houses. I thought my house would have

been blown away and had to shore up all the doors and windows S. West to prevent them being blown in.

The track of the PLUTO's *Cyclone.*

The foregoing comprises all that I have been able to collect in the way of documents I now proceed to say on what grounds I have laid down the track of this Cyclone.

We find that unfortunately the wind is only marked once at 11 P. M. of the 21st (civil time), throughout the *Aratoon Apcar's* log of the 22nd, which is kept in Nautical time, but that throughout the 21st she had unsteady winds varying as to force from calm at sunset to strong breezes at 8 P. M.; then moderate again with gloomy threatening weather at midnight, and at 4 A. M. on the 22nd fresh breezes; but during the whole of the 21st, she had the sea even during the calm at sunset very turbulent and breaking in all directions. We may then fairly suppose that she was with this sea in some part of the wake of the Cyclone, and her falling barometer from Noon of the 22nd would seem to indicate that her N. Westerly course was bringing her within the true Cyclone circle.

We have only at 1 P. M. on the 22nd the wind marked "Southerly" and at 7 A. M. on the 23rd it is marked as S. W., so that as it was blowing a hard gale from midnight we may fairly say that at midnight 22nd—23rd she had run into the Cyclone on its S. Easterly quadrant, and from thence if we take the wind to have been veering gradually that it may have been about S. W. b. S with her at that time, or perhaps even S. S. W., either of which estimates would place the centre of *a* Cyclone to the E. N. E. of her, or somewhere about Barren Island, and vague as this is, I have so marked it for midnight in the Chart for the sake of reference, for, as will be presently seen, the distance is so great that it is impossible to consider this gale and the *Pluto's* Cyclone as the same circular storm.

On the 23rd from midnight up to Noon we find that the *Aratoon Apcar* had the weather very severe and the sea is described as awful. After Noon in this day it appears to have moderated rapidly, but the wind is again most carelessly marked as "Westerly," and we cannot hence pronounce with any degree of certainty that her gale was a Cyclone at all or a mere setting in of the S. W. monsoon.

For it will be seen by the Charts that from the centre, which we

have approximately estimated about Barren Island, for the supposed Cyclone of the *Aratoon Apear* at midnight 22nd—23rd of May, to the spot where the centre *certainly* passed over the *Pluto* at 7 A. M. on the 23rd is a distance of 222 miles, so that if suppose the Cyclone to be the same storm, it must have travelled at the rate of nearly 32 miles an hour, a far higher rate of travelling than we have yet ascertained for the storms of the Bay of Bengal except in one instance.

The log of the *Laidmans* unfortunately affords us no assistance, as no positions are given, but from what is said she appears to have been dismasted very near to the centre, and not far to the S. Westward of the *Pluto*.

It seems therefore safer to suppose that the *Pluto's* Cyclone was an independent storm, and that that of the *Aratoon Apear* was also possibly or probably a Cyclone, which either broke up or ran on ahead of the vessel passing out, as in the case of the Erin's Cyclone, Twenty-second Memoir Journ. Asiatic Society of Bengal Vol. XXIII. by the Cocos passage. I have thus marked only a single circle for it, at midnight 22nd—23rd to remind the mariner of the great probability of the Southern, S. Western and South Eastern gales of the open part of the Andaman Sea being quadrants of Cyclones of which the track lies over or near to the two Volcanoes.

We have then only to deal with the *Pluto's* Cyclone which evidently,—and this constitutes its great interest,—came up from the South West, and was travelling to the N. East. It appears to have given as usual its first indications by the increasing swell from the S. West after Noon; by midnight it was a gale from the S. East; but we have no data from which to estimate the distance of the centre at this time, and can thus only mark for it also a circle with a track of an undefined extent in the directions which we fortunately know it to have taken, the centre of the circle being, as nearly as can be estimated, the *Pluto's* position at 7 A. M. when the calm centre passed her.

We next find that at the *Tavoy* light vessel, which is anchored off Elephant point in Lat. 16° 19′ N.; Long. 96° 25′ East at the entrance of Rangoon River, it *commenced* blowing very hard from the E. S. East at 7.30 A. M. on the 23rd, about the time the *Pluto*

had the centre passing her, and that it was veering (or *shifting* says the log) so rapidly at 1.30 P. M. to N. N. W. from E. S. E. that it was not more than five minutes in doing so. Hence there is no doubt that the centre passed close to the Eastward of her, and doubtless, as estimated in the reports from thence, somewhere between Rangoon and the Sitang river-mouths, about 45 miles to the East of her. If we say that the centre bore due East 20 miles from the *Tavoy's* position at 1 P. M. we shall then have, from its estimated place with the *Pluto* at 7 A. M. to this spot at 1 P. M., a distance of about 70 miles for its progress in six hours, or $11\frac{4}{6}$ miles per hour for its rate of travelling, which is not an unusual one, and one founded on fairly estimated data is, I think, far preferable to the forced conclusion of supposing the *Aratoon Apcar's* Cyclone to have travelled at the rate of thirty-two miles per hour?

We have thus the remarkable fact of a small but severe Cyclone forming, or descending perhaps, about Narcondam, since it dismasted the *Laidmans* probably at some distance W. S. West of the spot where its centre passed over the *Pluto* and travelling up *to the N. East* and our Chart, on which I have placed for comparison the former tracks of the *Briton* and *Runnimede's* and of the *Erin's* Cyclones, will shew that, in confined Volcanic seas like this, the tracks are apparently subject to no general rule, at least to none that we can at present venture to predicate.

Other Phenomena.

There was in this Cyclone the usual absence of thunder and the faint lightning described seems to have been more the glaring of strong electrical action than true lightning.

The frothing of the sea during the passage of the centre is by far the most remarkable phenomenon in this Cyclone, and I have endeavoured to elicit, as will be seen in the queries, all possible information regarding it, and Captain Boon and his officers all agree together in comparing the motion of the sea to the seething of a cauldron. I think this has been noticed before? but I cannot now find the reference, and on one occasion in the S. East part of the China Sea between the shoals and the coasts of Borneo, in the month of October after several days of gloomy rainy weather, perhaps from a Cyclone in the Northern part of the sea, I myself observed it to

occur, but in this instance it was more like the bubbling of gas in a spring, than the frothing described by Capt. Boon and his officers.

The Management of the Pluto.

The sailors will not fail to remark, and indeed it excited much attention amongst Nautical men in Calcutta at the time, that this seems to be at first sight the case of an encumbered Steamer, which might certainly, one would think, have got out of the way of the centre, allowing herself to be caught in it to the imminent risk of the vessel and the lives of all on board; but as will be seen by the following letter addressed to the Superintendant of Marine, Capt. Boon did all that his vessel would allow him to do, in the very difficult position in which he was placed.

Captain T. E. Rogers, *Superintendant Marine.*

Sir,—In reply to your demi-official communication with copies of H. C. Str. *Pluto's* log and Captain Boon's letter I have the honor to say.

1. That it is very certain that our knowledge of the tracks of the Cyclones in the Andaman Sea is very uncertain, and that, as quoted by Captain Boon, the only track given in the Horn Book, which is laid down from the (then) only recorded storm, is one from the E. S. E. to the W. N. W. My new Memoir, the 22nd of the series, just sent to you; shews a new track for them, namely from the S. b. E. S. and S. S. E. to the N. N. W. and N. W. b. N. between the two volcanos of Narcandam and Barren Island, and out by the Preparis passage. This memoir however Captain Boon could not have seen. The present Cyclone gives us another and is probably an instance of a re-curving track.

2. Captain Boon very rightly steams for an offing and correctly judges at 9 p. m. that the centre of the Cyclone bears S. W. of him, and this is confirmed by the swell from S. W., but he is necessarily still uncertain as to its track, and, as any one would have done, still steams out for an offing, and so far obtains one that he deepens off the bank to no ground with twenty fathoms, if I read his log correctly?

3. At midnight, however, there was no doubt of the track of the Cyclone to the N. Eastward since the wind was steady at S. E. and Barometer falling fast, and the steamer had not more than held her

own as to position and the question now became what was best to be done?

4. The ship's *true* position at this time has first to be considered, and, taking into account—

a. The Northerly set shewn by the bearings and soundings since point Baragni was sighted.

b. The heave of the S. Westerly sea.

c. The storm current setting him to the N. West.

d. The storm wave setting him to the N. East.

e. The inset of the flood tide to the Sitang and other mouths of the Delta whenever it made—taking all these considerations into account, then, I think Captain Boon could not have estimated himself as having done more than held his own as to latitude, though he had deepened his water by a few miles of Eastering carrying him off the bank. So that, at most, point Baragui was still bearing W. N. W. or W. b. N. of him. The extreme of the flat more Southerly of course.

5. Theoretically, and as a scientific landsman might suppose, it is trne that now (at midnight) with the S. E. hurricane Captain Boon might have wore round and bringing the S. E. gale on his port qnarter have dashed past to the Northward of the Cyclone centre, trusting to bring the wind, as he no doubt wonld quickly have done, to E. S. E., East, and E. N. E., and N. East, and thus enabling him to clear the flat by steaming close ronnd the centre on its N. Western qnadrant.

6. But there were many dangers in doing this, such as—

a. Would the vessel steer well enough in a quartering gale with her encumbered decks and the confused sea of a Cyclone? I should doubt it of any paddle-wheel steamer, especially of the old build, unless with the wind nearly right aft, and, in any case, with the frightful seas of a Cyclone, when so near the centre there is constantly an imminent risk of broaching to.

b. She could not start with the gale at S. East on any thing nearer the wind than a W. S. W. course and I doubt if she wonld have done that? With the influences of which we have spoken in para. 4, a West conrse made good would be the utmost that any sailor would calculate upon with the wind at S. East at such a time.

d. There was also more danger than an utter want of sea room, for, short of making a S. W. course at least, which for the first hour or two was out of the question, a single hour's run must have carried the *Pluto* into say nine or at most ten fathoms water.

7. And in a Cyclone, this shoaling of the water, it should be held in mind, is a fearful danger. The deep water sea is, we know, terrific, but in small soundings it becomes exactly a *surf* from all quarters, in which nothing can live. I was assured by eye-witnesses in 1812, when the wreck of H. M.'s Frigate *Dover* was yet lying on the beach at Madras, that the *surf* in the great Cyclone of 1809 *broke* in nine fathoms water; and you yourself, Sir, know well what the sea is at the entrance to Bombay Harbour, if the shore is too closely borrowed on in the S. W. Monsoon. If the *Pluto* then had even cleared the shoal off the point, I think that in any thing less than twelve fathoms, she must have been swamped. It is impossible for the most sanguine to suppose that she could have passed it at that distance; and to Captain Boon's resolutely steaming out for the deep water, whether it was done in the contemplation of this peculiar danger or not, I think we owe the preservation of the vessel. When the track was ascertained, Captain Boon could not get to the E. N. E. to be a little out of the way of the centre, for his engines were already powerless.

8. The case then altogether appears to be one of those unfortunate ones in which for want of sea-room nothing can be done to avoid the centre; but the advantage which the law of storms ill gives us is that the sailor *knows what is coming*, and, as Captain Boon has most creditably done in this case, takes his precautions accordingly, so far as he can.

I am Sir,

Your's very obediently.

H. P.

Calcutta, May 13th, 1854.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

For March, 1858.

The Monthly General Meeting for March was held on the 3rd instant.

Hon'ble Sir James Colvile, Knt., President, in the chair.

The proceedings of the last Meeting were read and confirmed.

Presentations were received :—

1. From the Imperial Geological Institute of Austria in Vienna, a complete series of the publications of the Institute, comprising twenty volumes beautifully illustrated.

2. From the Ven'ble Archdeacon Pratt, some valuable Astronomical works.

Letters from J. J. Gray, Esq., R. Cust, Esq., and Dr. Campbell, announcing their wish to withdraw from the Society, were recorded. Mr. Gray stated, that he had written to announce his intention in Nov. last. His letter, however, had not been received.

Mons. R. Schlagintweit was balloted for as a corresponding member of the Society, and declared elected.

The Council submitted the following report :—

The Council beg to recommend that Bryan Houghton Hodgson, Esq., and Dr. H. Falconer be elected Honorary Members of the Society.

Mr. Hodgson has been for twenty-five years a member of the Society, and has been a constant contributor to the Transactions and Journals. His papers published by the Society amount to the large number of 118, embracing the most varied subjects in Philology, Archæology, Geography, Ethnology, and Natural History.

He has at the same time contributed largely to other scientific bodies, and his reputation is widely spread amongst the cultivators

of learning and science, not only in India and England, but throughout the civilised world.

He is a corresponding member of the French Institute, and an Honorary member of many of the other Literary and Scientific Societies of Europe, and has had the honor of being appointed a Chevalier of the Legion of Honor of France, in special acknowledgment of his valuable researches into the History and Philosophy of Buddhism.

Dr. Falconer has also long been a member of the Society. He was for many years Superintendent of the Botanic Gardens of Saharunpore and Calcutta, and is one of the most distinguished naturalists of India, conspicuous as a botanist, and still more so for his labours in palæontology, which have obtained for him the highest honors the Royal Society of London can bestow. Dr. Falconer was one of our most active members, and the Society has recently been under especial obligations to him for arranging and describing their valuable collection of fossil vertebrata, the catalogue of which is now in course of publication.

Communications were received—

1. From Mr. Freeling, a note on his collection of coins lost during the rebellion.

2. From Mr. Chapman, Under-Secretary to the Government of India, forwarding the following memo. shewing the measurements of the native of the Andamans who was recently brought to Calcutta :—

Name—John Andaman.
Sex—Male.
Age—About 25 years.
Native Country—Andaman Islands.
Caste—None.

MEASUREMENTS.

	Feet.	*Inches.*
1. Total height,.....	4	$9\frac{1}{2}$
2. Width of the Arms horizontally extended,...	4	1
3. Vertex to the beginning of the hairs of the forehead,.....		$4\frac{1}{4}$
4. Vertex to the Orbit,.....		$7\frac{1}{3}$

5. Vertex under the brows,		$9\frac{1}{5}$
6. Vertex to the mouth,		$10\frac{5}{8}$
7. Vertex under the chin (the head,)	1 by	$\frac{5}{8}$
8. Circumference round the frontal sinusses,	1	$8\frac{6}{8}$
9. Vertex to the claviculæ,	1	$2\frac{1}{2}$
10. Diameter of the head by the temples,		$6\frac{3}{8}$
11. Antero-posterior diameter of the head,		$7\frac{1}{8}$
12. Interior distance of the eyes,		$1\frac{1}{2}$
13. Exterior distance of the eyes,		$4\frac{1}{2}$
14. Length of the mouth,		$2\frac{6}{8}$
15. Length of the ear,		$2\frac{1}{2}$
16. Length of the hand,		$6\frac{1}{2}$
17. Length of the foot,		9
18. Breadth of the hand,		3
19. Breadth of the foot,		$3\frac{6}{8}$
20. From the ground to the middle of the patella,	1	$4\frac{1}{2}$
21. Diameter by the acromion apophysis,	1	$1\frac{2}{3}$
22. Length of the arm from the acromion process,	1	$6\frac{7}{8}$
23. From the ground to the trochanter,	2	$6\frac{7}{8}$
24. Circumference round the calves,		$10\frac{2}{8}$
25. Circumference round the knee,	1	$0\frac{3}{8}$
26. Distance of the malar bones,		$5\frac{7}{8}$
27. Breadth of the nose,		$1\frac{7}{8}$

(Signed) F. J. Mouat,
President, Andaman Committee.

Dr. Thomson gave an account of his visit to the Glaciers of Kinchinjunga in Sikkim, in October last.

The thanks of the meeting were accorded to Dr. Thomson for his interesting account.

The Librarian submitted his usual monthly report.

Library.

The Library has received the following accessions during the month of February, 1858.

Presented.

Naturwissenschaftliche Abhandlungen Gesammelt und Durch Subscription Herausgegeben von Wilhelm Hardinger, Vols. I. to IV. royal 4to. Wien, 1847.—By the Imperial Geological Institute of Austria in Vienna.

Abhandlungen der K. K. Geologischen Reichsaaustalt, vols. I. to III. *Wien*, 1852, royal, 4to.—By the same.

Jahrbuch der Kaiserlich-Königlichen Ditto, vols. I. to III. royal 8vo. *Wien*, 1855.—By the same.

Berichte über die Mittheilungen von Freunden der Naturwissenschaften in Wien, vols. I. to VII. 8vo.—By the same.

Selections from the Records of the Madras Government, No. XLIV. Report of the Railway Department, 1857, 4to.—By the Madras Government.

Damoiseau's (M. Le Baron de) Tables de la Lune formées par la Seule Théoree de l'Attraction, *Paris*, 1828, folio.—By the Venerable Archdeacon Pratt.

Delambre, (M.) Burg (M.) Tables du Soleil et de la Lune, *Paris*, 1806, 4to.—By the same.

Bouvard's (M. A.) Tables de Jupiter, de Saturne et D'Uranus, *Paris*, 1821, 4to.—By the same.

Lindenaw's (Bernhard de) Tables Nouvelles De Vénus, *Marseilles*, 1811, 4to.—By the same.

———— Tables of Mercury, 2 copies, *Gothæ*, 1813, folio.—By the same.

———— Tables of Venus Eisenberg, 1821, folio.—By the same.

Selections from the Records of the Government of Bengal, No. XXXVII. 2 copies, on Colonization, Commerce, Physical Geography, &c. &c. of the Himalaya Mountains and Nepal, By Brian Houghton Hodgson, Esq. B. C. S.—By the Government of Bengal.

Discours de M Garcin de Tassy, *Paris*, 1857, *pamphlet*.—By the Author.

Zeitschrift der Deutschen Morgenlandischen Gesellschaft, Band XI. Heft 4. *Liepzig*, 1857.—By the German Oriental Society.

Journal of the Statistical Society of London, vol. XX. Part IV. December, 1857.—By the Society.

List of Fellows of Ditto.—By the same.

General Report of the Director of Public Instruction in Lower Provinces for 1850-57.—By the Director.

Notices of the Meeting of the Members of the Royal Institute of Great Britain, *pamphlet*, Part VII.—By the Institution.

The Vividhárta Sungraha, No. 45.—By Baboo Rajendrala'l Mitra.

A (Map) Plan of the country bordering the Great Trunk Road between Benares and Delhi.—By Major H. L. Thuillier.

The Oriental Baptist for February, 1858.—By the Editor.

The Christian Spectator for December, 1857.—By the Editor.

The Calcutta Christian Observer for Feb. 1858.—By the Editors.

The Indian Annals of Medical Science for January, 1858.—By the Editor.

The Madras Journal, No. 43.—By the Editor.

Exchanged.

The Atheneum for November, 1857.

Annalen der Chemie und Pharmacie, October, 1857, Band LIV. Heft. I.

Purchased.

Literary Gazette, Nos. 2131 to 2134.

Journal des Savants, October, 1857.

Comptes Rendus, Nos. 18 to 22, 19th October to 30th November, 1857.

Revue des Deux Mondes, 15th November and 1st December, 1857.

——— et Magasin De Zoology, No. 10.

The Annals and Magazine of Natural History, No. 120.

Annales des Sciences Naturelles, Tome VII. No. 2.

The Useful Plants of India, Part I, *Trevandrum*, 1856, pamphlet.

American Journal of Science and Art for November, 1857, No. 72.

Livingstone's Mission to Africa, 8vo.

British Workman, Nos. 34, 35 and 36.

As. Soc. Rooms,
The 5th March, 1858.

Gourdas Bysack,
Librarian and Asst. Secy.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1858.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11 feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.993	30.077	29.919	0.158	69.8	81.2	59.0	22.2
2	.959	.032	.873	.159	70.7	81.4	62.1	19.3
3	30.028	.124	.979	.145	68.9	78.6	61.7	16.9
4	29.988	.058	.917	.141	68.0	79.4	56.8	22.6
5	.955	.026	.874	.152	71.3	82.6	61.0	21.6
6	.970	.061	.924	.137	73.1	81.8	64.6	17.2
7	*Sunday.*							
8	30.061	.142	30.007	.135	66.6	74.1	61.6	12.5
9	.046	.140	29.981	.159	65.1	75.5	55.0	20.5
10	.020	.102	.964	.138	67.2	77.4	57.2	20.2
11	29.986	.056	.932	.124	67.3	77.6	61.0	16.6
12	.943	.033	.869	.164	70.0	80.0	62.6	17.4
13	.950	.035	.900	.135	71.7	79.2	67.0	12.2
14	*Sunday.*							
15	.950	.029	.886	.143	68.4	79.4	58.8	20.6
16	.977	.046	.923	.123	69.5	80.6	59.4	21.2
17	30.023	.108	.969	.139	71.2	83.5	62.0	21.5
18	.018	.097	.959	.138	71.5	83.4	60.4	23.0
19	29.972	.049	.912	.137	72.7	84.9	61.2	23.7
20	.945	.018	.874	.144	75.2	85.5	66.2	19.3
21	*Sunday.*							
22	30.000	.084	.949	.135	76.3	86.0	69.6	16.4
23	.015	.112	.945	.167	73.4	84.2	63.6	20.6
24	29.969	.059	.886	.173	72.8	85.6	60.8	24.8
25	.921	29.999	.842	.157	74.8	86.9	65.0	21.9
26	.898	.982	.826	.156	73.6	82.8	66.7	16.1
27	.886	.977	.821	.156	74.5	85.9	65.2	20.7
28	*Sunday.*							
..	....	....	....	....	....	....	....	....
..	....	....	....	....	....	....	....	....
..	....	....	....	....	....	....	....	....

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1858.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon. *(Continued.)*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a cubic foot of Air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	61.3	8.5	57.0	12.8	0.473	5.20	2.75	0.65
2	62.4	8.3	58.2	12.5	.493	.41	.77	.66
3	60.2	8.7	55.8	13.1	.455	.02	.72	.65
4	59.0	9.0	53.6	14.4	.422	4.67	.86	.62
5	65.4	5.9	62.4	8.9	.567	6.22	.11	.75
6	67.8	5.3	65.1	8.0	.619	.78	.01	.77
7	*Sunday.*							
8	58.2	8.4	53.2	13.4	.416	4.62	.59	.64
9	57.5	7.6	52 9	12.2	.412	.59	.30	.67
10	59.3	7.9	54.6	12.6	.437	.83	.52	.66
11	62.7	4.6	59.9	7.4	.521	5.77	1.60	.78
12	66.5	3.5	64.7	5.3	.611	6.73	.27	.84
13	67.2	4.5	64.9	6.8	.615	.75	.68	.80
14	*Sunday.*							
15	60.5	7.9	55.8	12.6	.455	5.02	2.60	.66
16	59.4	10.1	54.3	15.2	.432	4.76	3.12	.60
17	62.1	9.1	57.5	13.7	.481	5.28	.02	.64
18	62.2	9.3	57.5	14.0	.481	.28	.10	.63
19	62.9	9.8	58.0	14.7	.489	.34	.34	.62
20	67.9	7.3	64.2	11.0	.601	6.54	2.83	.70
21	*Sunday.*							
22	67.6	8.7	63.2	13.1	.582	.32	3.37	.65
23	62.1	11.3	56.4	17.0	.464	5.06	.81	.57
24	62.2	10.6	56.9	15.9	.472	.15	.56	.59
25	65.3	9.5	60.5	14.3	.532	.80	.46	.63
26	64.9	8.7	60.5	13.1	.532	.81	.12	.65
27	66.3	8.2	62.2	12.3	.563	6.14	.04	.67
28	*Sunday.*							
..	....	....	....	....	....	....	....	....
..	....	....	....	....	....	....	....	....
..	....	....	....	....	....	....	....	....

All the Hygrometrical elements are computed by the Greenwich constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1858.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Midnight.	29.984	30.051	29.886	0.165	66.4	72.4	61.2	11.2
1	.976	.045	.876	.169	65.5	71.6	58.8	12.8
2	.965	.028	.870	.158	64.8	71.4	58.0	13.4
3	.955	.029	.863	.166	64.3	71.1	56.6	14.5
4	.952	.036	.868	.168	63.8	70.4	58.8	11.6
5	.962	.040	.879	.161	63.1	70.2	55.6	14.6
6	.978	.069	.901	.168	62.4	70.0	55.2	14.8
7	30.005	.086	.935	.151	62.1	69.6	55.0	14.6
8	.033	.111	.957	.154	65.2	71.6	58.0	13.6
9	.053	.128	.977	.151	69.6	75.0	64.0	11.0
10	.060	.142	.977	.165	73.0	77.6	66.6	11.0
11	.044	.128	.963	.165	75.7	80.8	69.2	11.6
Noon.	.013	.101	.933	.168	78.3	83.2	71.2	12.0
1	29.978	.073	.892	.181	80.0	85.2	72.5	12.7
2	.950	.043	.856	.187	80.9	86.6	73.0	13.6
3	.929	.024	.838	.186	81.3	86.9	72.0	14.9
4	.921	.007	.821	.186	80.4	85.5	69.6	15.9
5	.922	.013	.821	.192	79.1	84.4	67.4	17.0
6	.928	.024	.824	.200	75.7	81.4	67.4	14.0
7	.945	.036	.839	.197	73.1	79.0	66.8	12.2
8	.967	.061	.865	.196	71.3	78.2	64.6	13.6
9	.979	.063	.874	.189	70.0	77.1	64.6	12.5
10	.985	.074	.880	.194	68.6	74.2	63.0	11.2
11	.985	.060	.876	.184	67.7	72.0	61.8	10.2

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1858.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon. *(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic Force of Vapour.	Mean Weight of Vapour in a cubic foot of Air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
Midnight.	61.9	4.5	59.2	7.2	0.509	5.65	1.52	0.79
1	61.3	4.2	58.8	6.7	.503	.57	.41	.80
2	61.0	3.8	58.7	6.1	.501	.57	.26	.82
3	60.6	3.7	58.0	6.3	.489	.44	.28	.81
4	60.1	3.7	57.5	6.3	.481	.36	.25	.81
5	59.6	3.5	57.1	6.0	.475	.30	.17	.82
6	59.0	3.4	56.6	5.8	.467	.22	.11	.83
7	58.9	3.2	56.7	5.4	.469	.24	.03	.84
8	60.6	4.6	57.8	7.4	.486	.40	.51	.78
9	62.4	7.2	58.8	10.8	.503	.53	2.37	.70
10	63.4	9.6	58.6	14.4	.499	.46	3.30	.62
11	63.9	11.8	58.0	17.7	.489	.31	4.20	.56
Noon.	64.6	13.7	57.7	20.6	.485	.23	5.05	.51
1	65.3	14.7	57.9	22.1	.488	.25	.56	.49
2	65.8	15.1	58.2	22.7	.493	.29	.81	.48
3	66.0	15.3	58.3	23.0	.494	.30	.94	.47
4	65.6	14.8	58.2	22.2	.493	.31	.63	.49
5	65.5	13.6	58.7	20.4	.501	.41	.12	.51
6	66.0	9.7	61.1	14.6	.543	.90	3.61	.62
7	65.2	7.9	61.2	11.9	.544	.95	2.84	.68
8	64.5	6.8	61.1	10.2	.543	.96	.37	.72
9	63.9	6.1	60.8	9.2	.537	.91	.09	.74
10	63.0	5.6	60.2	8.4	.527	.82	1.85	.76
11	62.7	5.0	59.7	8.0	.518	.73	.73	.77

All the Hygrometrical elements are computed by the Greenwich constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1858.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	General Aspect of the Sky.
	o	Inches.		
1	133.7	..	W. & N. W.	Scatd. ⌐i and \i till 6 A. M. cloudless till 10 A. M. Scatd. \i and ⌐i till 6 P. M. cloudless afterwards.
2	136.0	..	S. W.	Cloudless.
3	135.2	..	S.W. & N. & N. W. & W.	Cloudless.
4	136.0	..	N.	Cloudless.
5	140.0	..	S. & N.	Cloudless.
6	140.0	..	S. E. & S.	Cloudless till 7 A. M. Scatd. ⌒i till 5 P. M. cloudless afterwards.
7	*Sunday.*	0.12		
8	128.7		N. W.	Cloudy till 7 A. M. Scatd. ⌐i and \i till 4 P. M. cloudless afterwards.
9	131.0	..	N. W. & N.	Cloudless.
10	134.2	..	N. W. & N.	Cloudless.
11	133.5	0.08	N. W. & N. E.	Cloudless till 4 A. M. Scatd. ⌐i till 10 A. M. cloudy afterwards. Also slightly drizzling between 2 and 5 P. M.
12	..	0.34	N. & N. E. & S. E.	Cloudy also raining between Midnight and 1 A. M. [8 A. M.
13	..	..	N. W. & N. & W.	Cloudless: also foggy between 6 and
14	*Sunday.*			
15	130.0	..	N. W. & Calm.	Cloudless.
16	135.0	..	N. W. & S. W.	Cloudless.
17	137.0	..	Calm & N. & S.	Cloudless.
18	143.0	..	S. W. & S.	Cloudless till Noon, Scatd. ⌐i till 4 P. M. cloudless afterwards.
19	138.6	..	W. & S. W. & S.	Cloudless.
20	138.0	..	S. W. & S.	Cloudless till 7 A. M. Scatd. ⌐i till 8 P. M. cloudless afterwards.
21	*Sunday.*			
22	133.0	..	W. & S. W. & N. W.	Scatd. ⌐i.
23	138.0	..	N. W.	Cloudless till 6 A. M. Scatd. ⌐i afterwards.
24	137.4	..	N. W. & W.	Scatd. ⌐i.
25	135.0	..	W. & S. W.	Scatd. ⌐i till 1 A. M. cloudless till 6 A. M. Scatd. ⌐i till 3 P. M. cloudy afterwards. Also very slightly drizzling between 8 and 11 P. M.
26	132.0	..	W. & N. W.	Scatd. clouds till 8 A. M. cloudless afterwards.
27	137.0	..	S. W. & S.	Cloudless till 11 A. M. Scatd. ⌐i till 6 P. M. cloudless afterwards.
28	*Sunday.*			

\i Cirri, ⌐i Cirro strati, ⌒i Cumuli, ⌒i Cumulo strati, ⌙i Nimbi, —i Strati, ⌙i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1858.

Monthly Results.

	Inches.
Mean height of the Barometer for the month, ...	29.978
Max. height of the Barometer occurred at 10 A. M. on the 8th, ..	30.142
Min. height of the Barometer occurred at 4 & 5 P. M. on the 27th, ..	29.821
Extreme range of the Barometer during the month, ...	0.321
Mean of the Daily Max. Pressures, ...	30.060
Ditto ditto Min. ditto, ...	29.914
Mean Daily range of the Barometer during the month, ...	0.146

	o
Mean Dry Bulb Thermometer for the month, ...	71.0
Max. Temperature occurred at 3 P. M. on the 25th, ...	86.9
Min. Temperature occurred at 7 A. M. on the 9th, ...	55.0
Extreme range of the Temperature during the month, ...	31.9
Mean of the Daily Max. Temperature, ...	81.6
Ditto ditto Min. ditto, ...	62.0
Mean Daily range of the Temperature during the month, ..	19.6

	o
Mean Wet Bulb Thermometer for the month, ...	63.0
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	8.0
Computed Mean Dew-point for the month, ...	59.0
Mean Dry Bulb Thermometer above computed mean Dew-point, ..	12.0
	Inches.
Mean Elastic force of Vapour for the month, ...	0.506

	Troy grains.
Mean Weight of Vapour for the month, ...	5.55
Additional Weight of Vapour required for complete saturation, ..	2.70
Mean degree of humidity for the month, complete saturation being unity,	0.67

	Inches.
Rained 4 days, Max. fall of rain during 24 hours, ...	0.34
Total amount of rain during the month, ...	0.54
Prevailing direction of the Wind, ...	N. W. & S. W. & W.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1858.

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour when any particular wind was blowing it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
	No. of days.																		
Midnight.	4						1	1	2		5		2		6		3		1
1	5						1	1	2		5		2		6		3		
2	5						2		1		5		2		6		3		
3	5						2		1		5		2		5		3		1
4	4						2		1		5		4		4		2		2
5	4						2		2		5		4		5		1		1
6	4				2		1		2		3		5		6		1		
7	7		2		2		1		2		2		3		5				
8	8		4		1		2		1		3		2		3				
9	6		5		1		2		1		3		2		4				
10	4		5		2		1		1		2		3		6				
11	4		2		2				1		4		3		8				
Noon.	1		2						2		4		4		11				
1	4		1						2		4		4		9				
2	1		1						2		7		4		9	1			
3	1		1				1		1		5		5		10				
4	1		1	1			1		1		2		6		12				
5	1		1	1			1		2		4		5		10				
6	2		1				1		5		4		4		7				
7	2		1				1		5		4		5		6				
8	2		1				1		5		4	1	5		6				
9	2		1				1		5		4	1	5		6				
10	2		1				1		5		4	1	4		6				1
11	2		1				1		5		4	1	5		6				